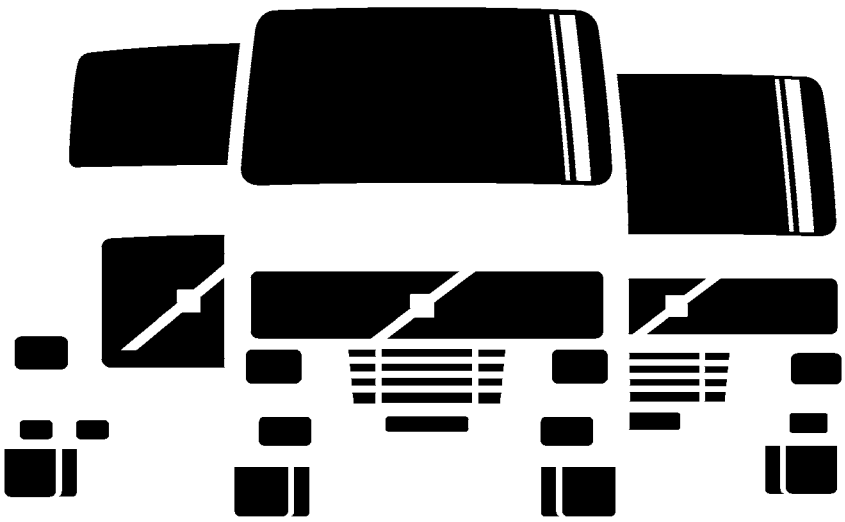
Service Manual
Trucks

Group **350–500**

Lighting Systems

VN from 2/98, VHD



PV776-TSP142952

VOLVO

Foreword

The descriptions and service procedures contained in this manual are based on designs and methods studies carried out up to November 2000.

The products are under continuous development. Vehicles and components produced after the above date may therefore have different specifications and repair methods. When this is believed to have a significant bearing on this manual, supplementary service bulletins will be issued to cover the changes.

The new edition of this manual will update the changes.

In service procedures where the title incorporates an operation number, this is a reference to an S.R.T. (Standard Repair Time).

Service procedures which do not include an operation number in the title are for general information and no reference is made to an S.R.T.

The following levels of observations, cautions and warnings are used in this Service Documentation:

Note: Indicates a procedure, practice, or condition that must be followed in order to have the vehicle or component function in the manner intended.

Caution: Indicates an unsafe practice where damage to the product could occur.

Warning: Indicates an unsafe practice where personal injury or severe damage to the product could occur.

Danger: Indicates an unsafe practice where serious personal injury or death could occur.

Volvo Trucks North America, Inc.
Greensboro, NC USA

Order number: PV776-TSP142952

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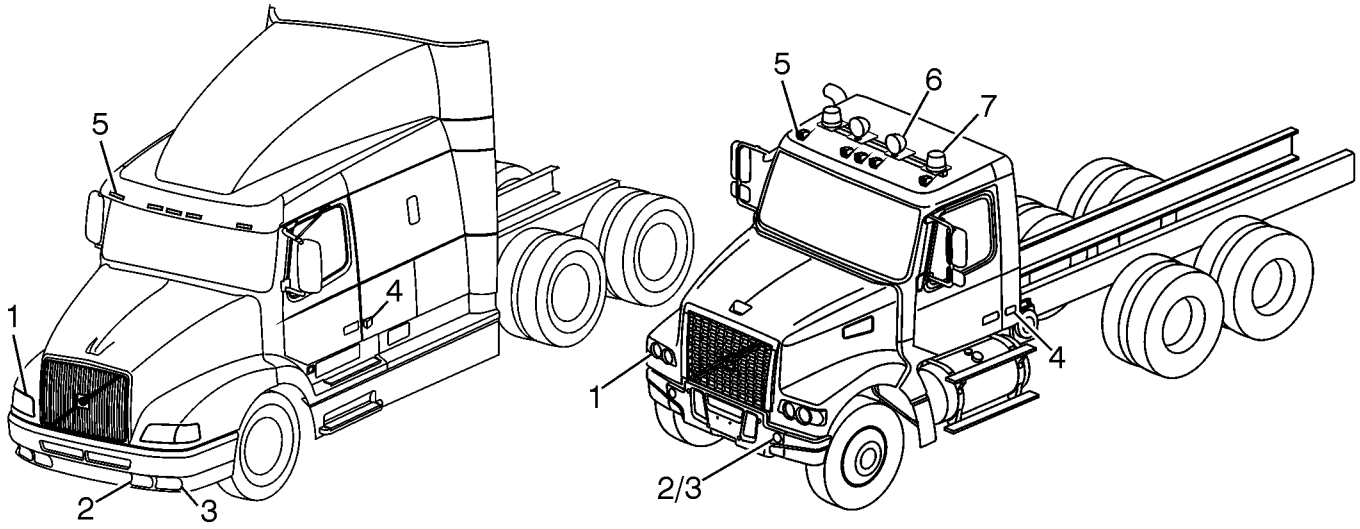
Feedback

Operation Numbers

General

Lighting System



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VN and VHD Models

1 Headlamps
2 Fog Lamps
3 Driving Lamps
4 Side Repeater Lamps
5 Marker Lamps
6 Snow Plow Lights
7 Beacon Lights

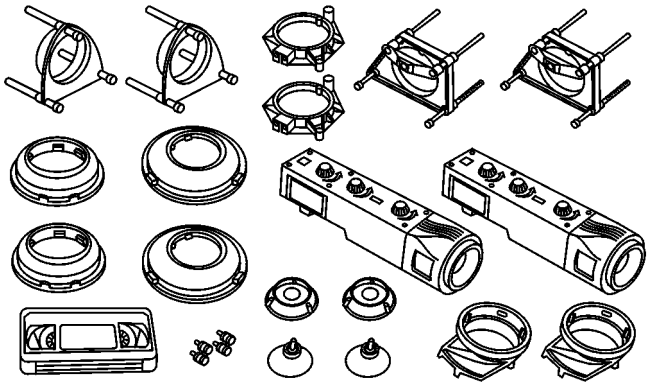
The vehicle lighting system is one of the most important safety systems on the vehicle. The lighting system illuminates the road ahead, gives information to others about our location and intentions and provides the driver with interior and convenience lighting to help make their jobs more safe and enjoyable. For these reasons, the vehicle lighting system should be a maintenance priority.

Note: Lighting components may be referred to as “lights” or “lamps” in this or other Volvo publications. Both terms have the same meanings and may be used interchangeably.

Tools

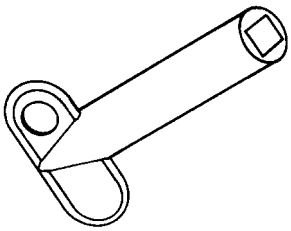
Lighting System, Special Tools

The tools referenced in this manual are listed below. They may be obtained from Volvo, or, where indicated, from Kent Moore at 1–800–328–6657.



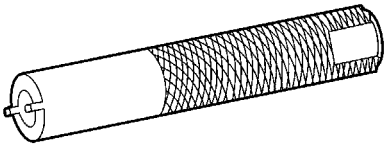
W0001970

J-25300–D Headlight Aiming Kit (Kent-Moore)



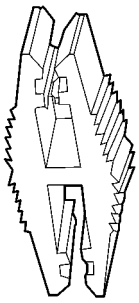
W3000642

1089953 Lamp Removal Tool (Volvo)



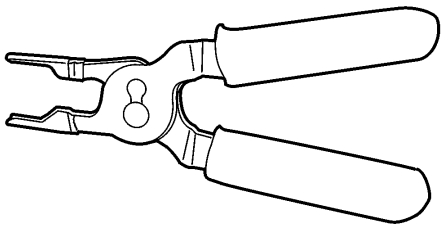
W0001927

J-42395 Rheostat Removal Tool (Kent-Moore)



W0001928

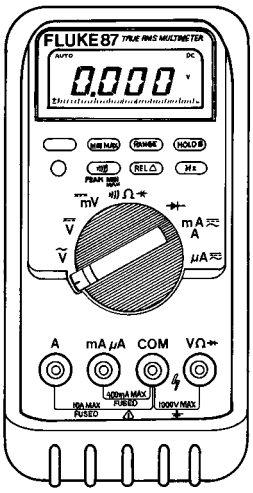
20378326 Fuse Puller Tool (Volvo)



W0001917

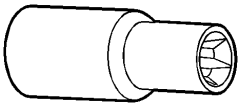
J-43244
Relay Puller Tool (Kent-Moore)

Lighting System, Special Equipment



W2001014

J-39200
Fluke 87 Digital Multimeter (Kent-Moore)



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External Torx Socket: Size E7 and E6
Available locally

Design and Function

Lighting System

Lamp Types

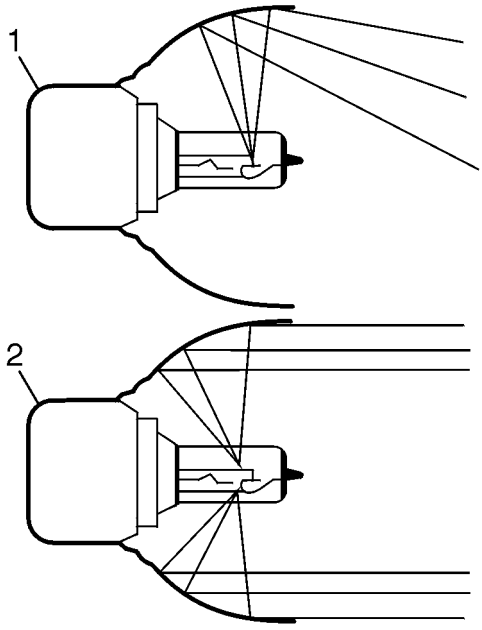
Headlamp bulbs

Headlight bulbs have two filaments, one for high beam and the other for low beam. The **low beam filament** (1) is masked below so that the light is spread upward into the reflector, which the directs the beam downward, so as not to temporarily blind oncoming vehicles. When the **high beam filament** (2) is on, the light is spread around by the reflector and is projected via the lens into a long, narrow beam.

VN-Series vehicles are equipped with replaceable halogen bulbs.

VHD-Series vehicles use standard sealed beam halogen bulbs.

Note: Do not touch the halogen bulb glass with fingers or allow the glass to be contaminated. Failure to keep the bulb glass clean will shorten its service life.



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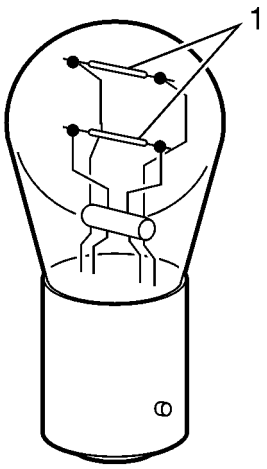
Incandescent Bulbs

The incandescent bulb has been the predominate lighting method in heavy-duty vehicles for many years. An incandescent bulb is constructed with a base, a glass bulb and tungsten filament wire or wires. When power is applied to the filament wire, it encounters resistance. This resistance causes the wire to heat and glow brightly. Over time, the filament wire evaporates to the point of failure, causing the bulb to “burn out.” Because the filament wire is very thin, its potential life span is reduced further due to road shocks, vibration and excessive voltages.Generally, incandescent bulbs have a life span of 200–15,000 hours, depending on the quality of bulb and its mounting environment.

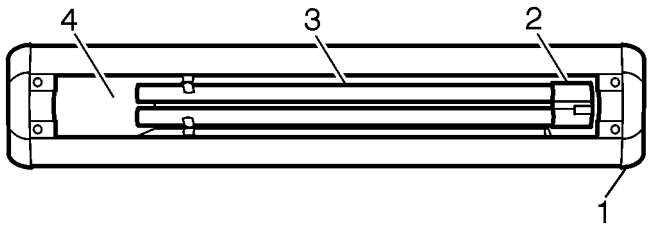


W3004453

Filament

Fluorescent Lamps

The light of a fluorescent lamp is not produced by an incandescent body (such as a bulb filament), but is emitted as a result of the excitation of atoms (namely, those of mercury vapor and the fluorescent coating on the inside of the light tube). Because if the size of the light-emitting area, a fluorescent lamp can illuminate a large area for the amount of power consumed. Fluorescent lamps are used for overhead lighting in the sleeper area of some VN series vehicles.



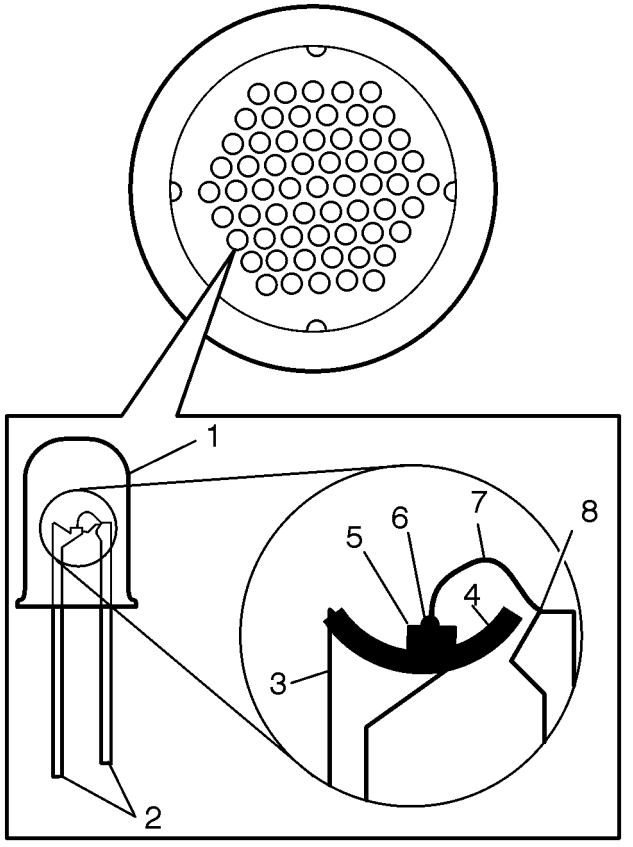
W3004433

1 Housing
2 Bulb Base
3 Fluorescent Tube
4 Reflector

LED Lights

Light Emitting Diodes or LEDs are solid state devices that generate light without gases or filaments. The light generating components are encapsulated in solid epoxy. Due to the design characteristics of LED lights, the effective life span is significantly longer than incandescent bulbs or fluorescent lamps. Typically, several LEDs are used in a single lamp, arrayed between a lens and housing. Some of the advantages of LED lights include

- Improved Safety. The faster “on time” of LEDs vs. incandescent bulbs (approximately 2/10 of a second) may allow for up to 20 additional feet of stopping distance at highway speeds.
- Reduced Current Demands. LEDs usually consume less than 25% of the current needed for incandescent bulbs.
- Improved Durability. Expected life span of 100,000 hours.



W3004452

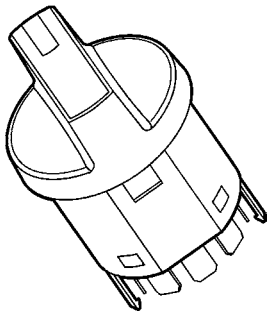
1 Epoxy
2 Anode/Cathode Leads
3 Lead Frame
4 Reflector Cup
5 LED Die
6 Ball Bond
7 Wire
8 Stitch Bond

Switches

Headlamp/Parking Lamp Switch

The headlamp (master lighting) switch is located in the dash panel to the right of the steering wheel. The switch has three positions: Off, Parking Lamps (side lamps) and Headlamps. The high beam/low beam or dimmer switch as well as the “flash to pass” switch is located in the turn signal switch, see “Turn Signal/Headlamp Dimmer Switch” page 10.

For more circuit information see “Headlamps, Simplified Schematic” page 31.



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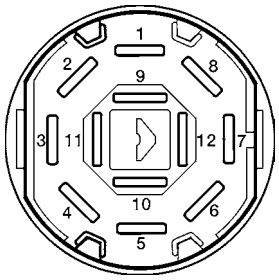
Switch



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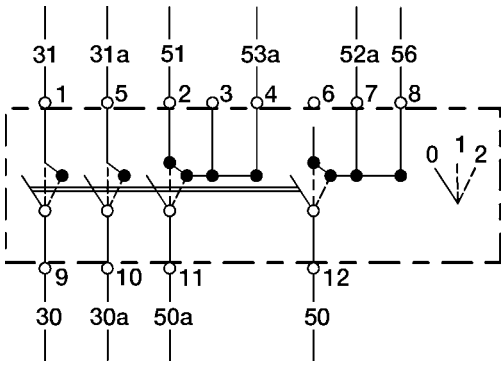
Switch, Wire Insertion Side View



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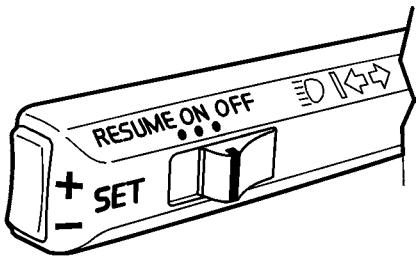
Internal Switch Logic

Turn Signal/Headlamp Dimmer Switch

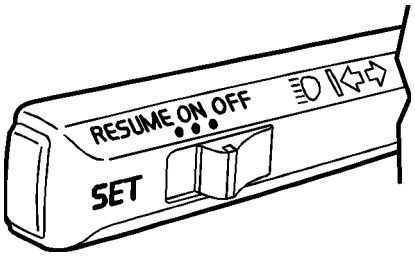
The controls for turn signals, cruise control and headlamp dimmer (high beam/low beam selection) are on the stalk switch on the left-hand side of the steering column. The headlamp dimmer works by pulling back on the stalk. This switch includes a “flash to pass” feature.

There are two designs of switches depending on the engine variant. The design features that are different are for the cruise control portion of the switch. The light portion of the switch is identical. For more information on the cruise control portion of the switch see service information in Group 30.



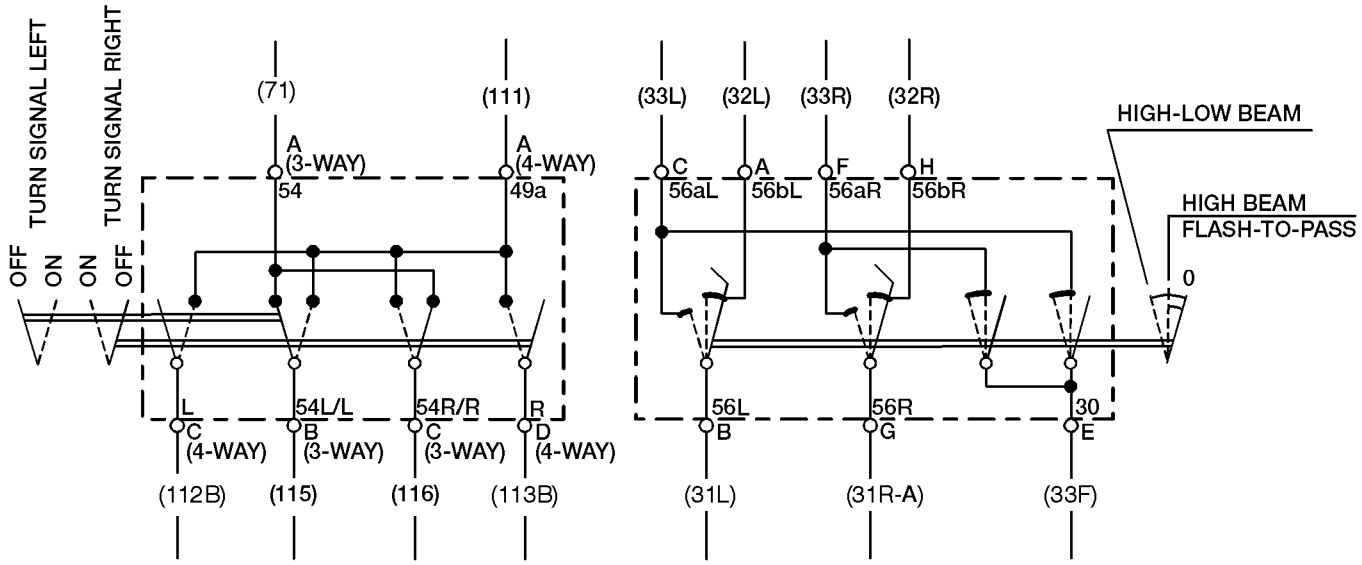
W3002499

Cruise Control Stalk Switch (Volvo Engines Only)



W3000807

Cruise Control Switch (Cummins and Detroit Diesel Engines)



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Turn Signal and High/Low Beam Switch

Note: Numbers inside parenthesis are circuit numbers.

Turn Signal Connector (3 way)		
Pin	Cicuit No.	Description
A	71	Stop lamp switch output
B	115	Left stop & turn lamp feed
C	116	Right stop & turn lamp feed

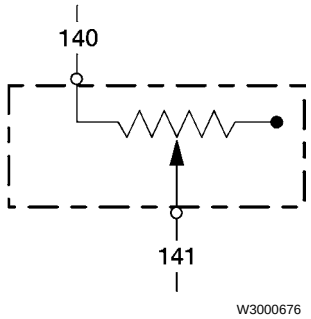
Turn Signal Connector (4 way)		
Pin	Circuit No.	Description
A	111	Turn signal switch feed
B		Not Used
C	112B	Left turn signal lamp & indicator feed
D	113B	Right turn signal lamp & indicator feed

For more circuit information on the turn signal/dimmer switch see “Stop/Hazard/Turn Lamps, Simplified Schematic” page 32.

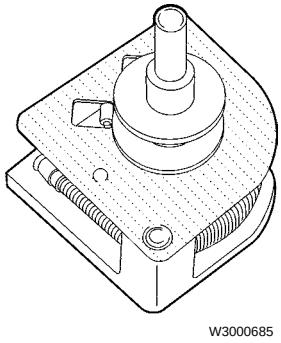
Headlamp Dimmer Switch Connector		
Pin	Circuit No.	Description
A	32L	Output to DRL module low beam, left
B	31L	Dimmer switch power supply
C	33L	Headlamp high beam ground, left
D		Not Used
E	33F	Flash to pass contract
F	33R	Headlmap high beam ground, right
G	31R-A	Dimmer switch power supply
H	32R	Output to DRL module low beam, right

Dash Dimmer Control Switch

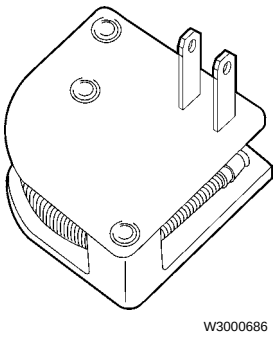
The dimmer control switch regulates the level of dash lamp intensity. By turning the switch, a rheostat varies the switch resistance from approximately 0 to 20 ohms to adjust the dash lamp intensity to the desired level.



Internal Switch Logic



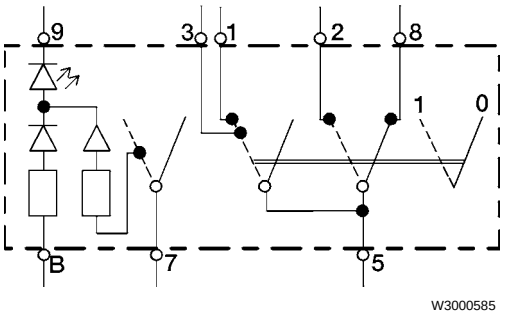
Switch



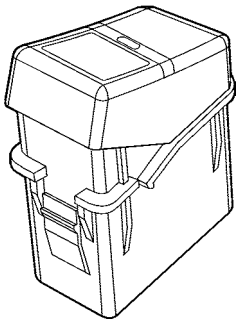
Switch, Wire Insertion Side View

Hazard Warning Switch

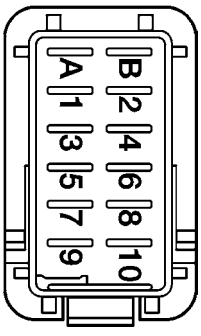
The hazard (four way flasher) switch icon will flash on and off with the hazard lights when activated. The icon is also illuminated whenever the head/park lamps are switched “ON.” Internal switch LED lights provide the illumination.



Internal Switch Logic



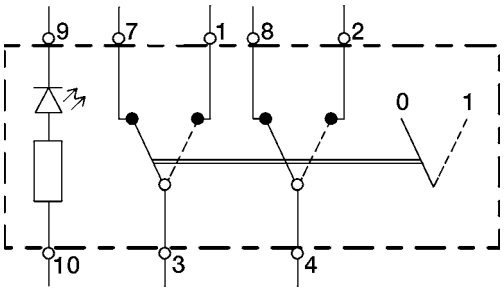
Switch



Switch, Wire Insertion Side View

Interrupt Switches

Marker and headlamp interrupt switches are used to temporarily open the lighting circuit that they are connected to. These switches are spring loaded to return to their normal position when cycled. They are illuminated with an internal LED light.



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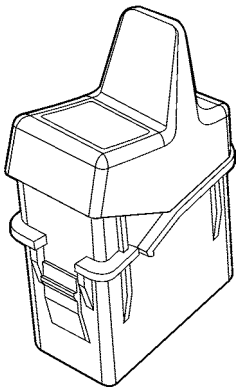
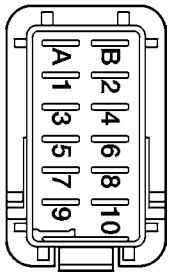
Internal Switch Logic



W3000578

Switch

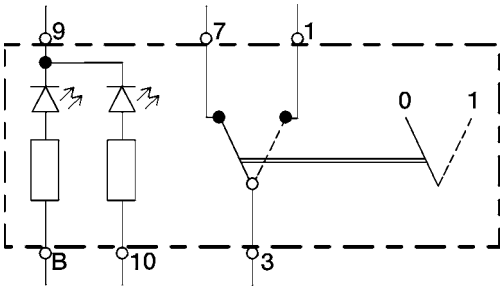


W3000577

Switch, Wire Insertion Side View

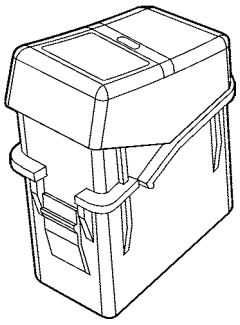
Lamp Switches

Several lighting systems that require a simple ON/OFF type switch use the switch shown. Icons on the switch help identify the switch purpose. The switch is illuminated by an internal LED light and may also have an indicator LED that illuminates when the switch is turned to “ON”.



W3000588

Internal Switch Logic



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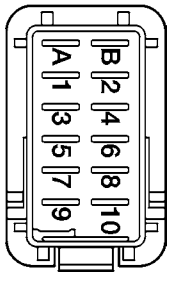
Switch



W3000577

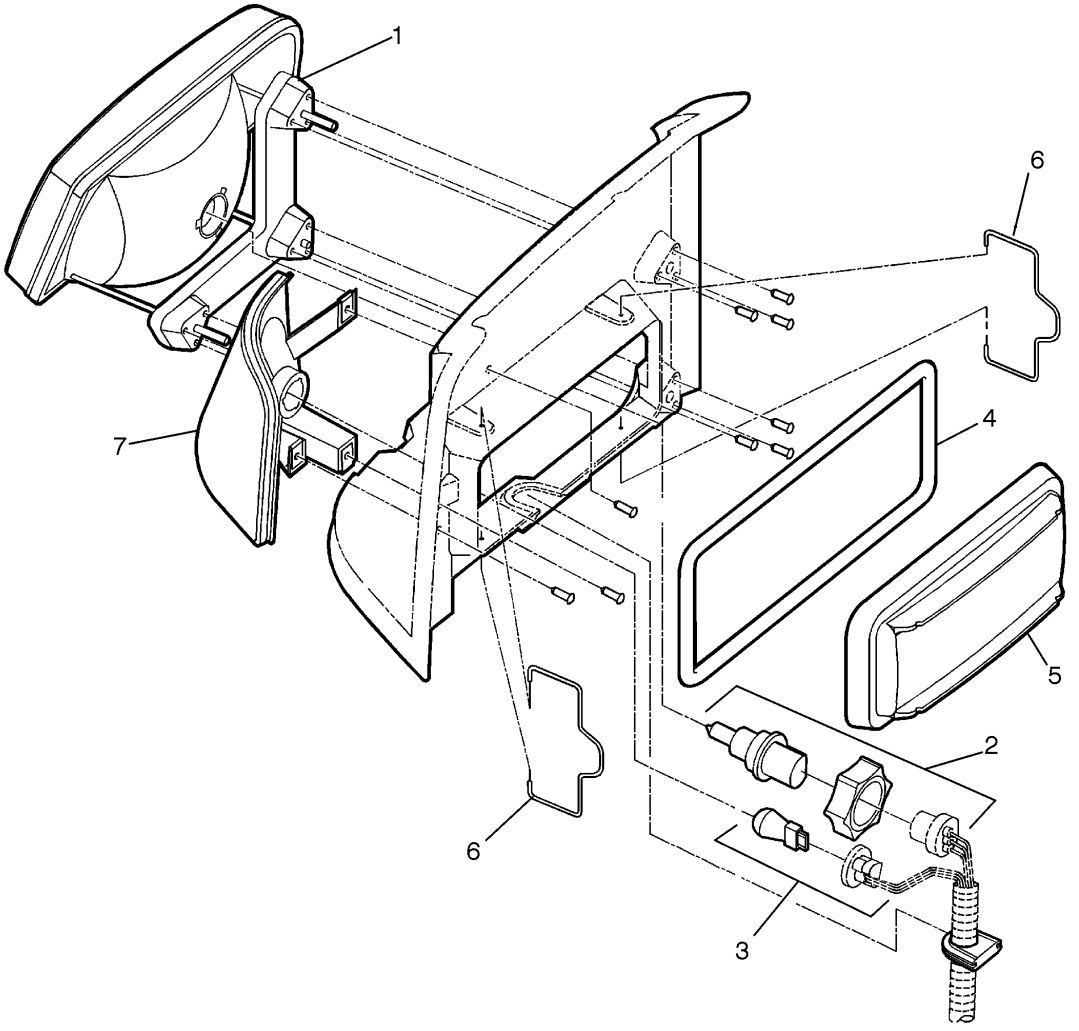
Switch, Wire Insertion Side View

Headlamps and Front Turn/Park Lamps

VN Models

The headlamps and turn signal/park lights are integrally mounted in the front hood to reduce aerodynamic drag. They are accessible from inside the engine compartment when the hood is raised. The headlamps use replaceable halogen bulbs. The assembly consists of a headlamp lens (1) that mounts to the outside of the hood and a bulb and socket (2) insert into the lens housing with a twist. The turn signal light assembly (3) is similar. There is a seal (4) and a cover panel (5) that mounts over the opening for the light assemblies. Spring clips (6) hold the cover tight enough to prevent water and debris from entering the lens housings, while still allowing easy access to the bulbs for replacement. The headlamp aiming adjustments are external to the cover panel and are not affected by bulb replacement.

The right and left headlamps are on separate circuits. Each is supplied power from the battery, through a fuse, and is controlled by the headlamp switch and dimmer switch. The low beam circuit is tied into the Daytime Running Lights circuit. For more information see “Headlamps, Simplified Schematic” page 31.



The front turn and park lamps (7) are in a single dual element bulb that is twisted into the lens assembly. For circuit information on the park (front marker) lamps, see “Tail/Marker/Sign/Back-up/Back of Cab Lamps, Simplified Schematic” page 34. For circuit information on the front turn and side repeater lamps see “Stop/Hazard/Turn Lamps, Simplified Schematic” page 32.

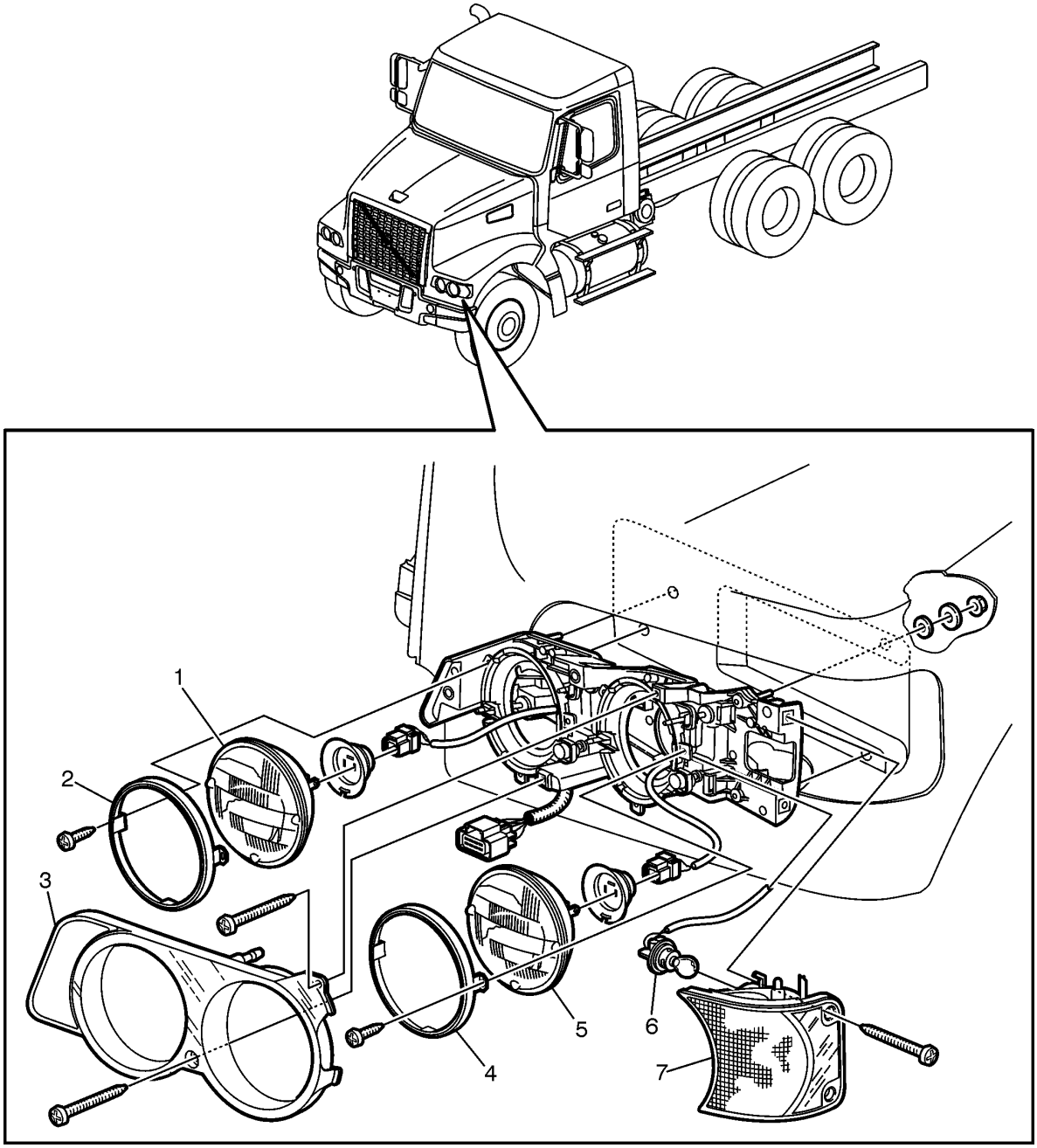
VHD Models

The headlamps and turn signal/park lamps are integrally mounted as assemblies in the hood. The assembly mounting bolts are accessible from the engine compartment with the hood raised. The headlamp bulbs are conventional sealed beam units. Each assembly consists of a high (1) and low (5) beam bulb as well as a turn/park lamp(7). Headlamp aiming is done via adjustment screws at the rear of the headlamp assembly. Headlamp bulb replacement does not affect headlamp aiming.

With “low beam” selected, only the outside headlamps illuminate. With “high beam” selected, all four headlamps illuminate. The right and left headlamps are separate circuits. Each is supplied power from the battery, through a fuse, and controlled by the headlamp switch and dimmer switch. The low beam circuit is tied into the Daytime Runnings Lights circuit. For more information see “Headlamps, Simplified Schematic” page 31.

The front turn and park lamps are in a single dual element bulb (6) that is twisted into the lens assembly. For circuit information on the park (front marker) lamps see “Tail/Marker/Sign/Back-up/Back of Cab Lamps, Simplified Schematic” page 34.

For circuit information on the front turn and side repeater lamps see “Stop/Hazard/Turn Lamps, Simplified Schematic” page 32.



W3004450

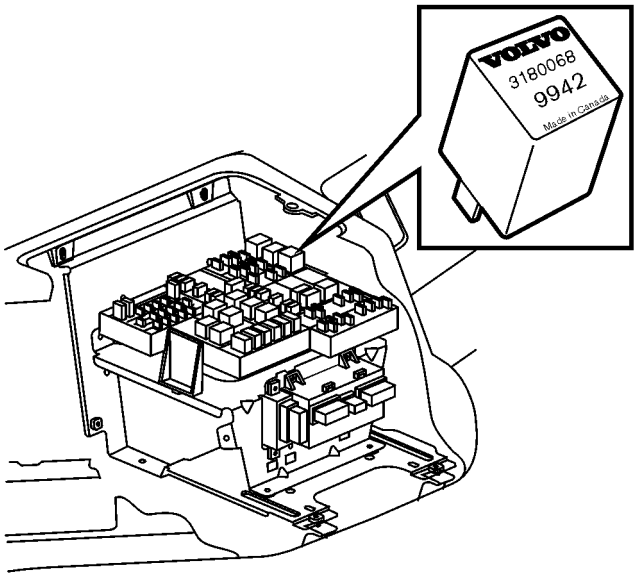
Daytime Running Lights

Daytime running lights (DRL) turn the low beam headlamps on, with reduced voltage, whenever the ignition is on and the parking brake is released. The DRLs will come on even though the headlight switch is off.

When the headlight switch is turned on, the DRL is disabled and an overriding DC voltage will be applied to the low beam headlamps. The DRL will also be disabled when the high beam switch is activated.

The optional headlamp interrupter switch will also disable the DRLs. When the switch is turned on, the DRLs will turn off. After the headlamp interrupter switch returns to the off position, the DRL will operate as normal.

The DRL module reduces the voltage to the headlamps by using pulse width modulation to “pulse” the low beams on and off at a rate of 115 Hz (which is faster than the eye can detect). If the applied voltage is 13.8 VDC, a DC voltmeter such as a Fluke 87 will show the average voltage between 7.5 and 8.5 VDC.



W3004444

DRL module

Operating voltage	9-16 VDC
Under voltage shutdown	6 VDC
Over voltage shutdown	24 VDC
Short circuit shutdown current	49 A

Daytime Running Lights Module				
Cavity	**Circuit No.**	**Description**	**Circuit State**	**Conditions**
85	40	12V supply	-	9-16 V
30	0H/OJ	Ground	-	Ground
86	45	High Beam Disable	High Beam On	9-16V
			High Beam Off	**Ground through high beam filaments**
87	42/420A	Park Brake Disable	P. Brake disengaged, Ignition in "crank" position	9-16 V
			P. Brake engaged	0-3 V
87A	44	Low Beam Output	DRL Active	Voltage pulse of 115 Hz
			DRL Inactive, Low Beams off	Ground through low beam filaments
			DRL Inactive Low Beams On	9-16 V

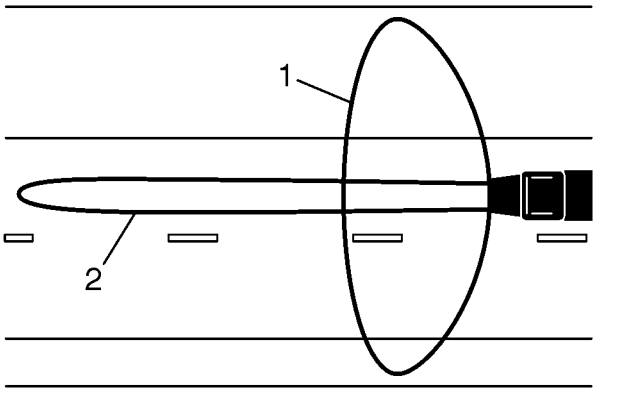
The DRL module works together with a relay located in the TEC tray. The output of the DRL module will feed both low beam lamps when the headlamp switch is OFF, but allows the headlamps to be powered through separate fuses when the headlamp switch is ON.

The DRLs will operate if the headlamps are OFF, ignition switch is ON and the parking brake is released. When these conditions are met, the DRL module supplies power via wire 44 to a splice. From the splice, wire 32L-A delivers power directly to the left headlamp, and wire 44A delivers power to the right headlamp through the normally closed DRL control relay contacts.

When the headlamp switch is ON, the DRL control relay coil is energized via wire 43A from the headlight switch. Once the relay is energized, the connection from the DRL module to the right headlight is opened, and the connection to the dimmer switch (via wire 32R) is closed. This turns on the right side low beams. The left side low beams are powered directly from the dimmer switch by wire 32L, to the splice, then by wire 32L-A.

For more circuit information see “Headlamps, Simplified Schematic” page 31.

Fog and Driving Lamps



Optional driving and fog lights are mounted in the front bumper. Both of these lights are controlled by a single Auxiliary light switch mounted to the right of the headlight switch on the dash.

The **fog light** (1) provides a short and wide beam that illuminates the road immediately in front of the vehicle. The **driving lights** (2) provide a long and narrow beam that reaches much further forward than the standard headlight.

Note: VHD vehicles are available with either fog or driving lights but not both.

Fog and Driving Light Operation				
	Low Beam Headlights	**High Beam Headlights**	**Parking /Marker Lights**	**Flash To Pass ***
Fog Lights	On	Off	On	Off
Driving Lights	Off	On	Off	On

* With Parking/Marker Lights on.

Fog and Driving Light Circuit Description

- Fog and driving lights are fed battery power via maxi-fuse 10 and through fuse 19. Fuse 19 feeds relay R1, which is energized by wire 140–A from the headlamp switch and grounded by 0R-G. Relay R1 feeds the Auxiliary (fog and driving) lamp switch via wire 34–A.
- When the Auxiliary lamp switch is turned *ON* power is sent through wire 39 to the LED input on the switch for switch illumination (wire 0J-G provides ground).
- Wire 39 goes from the Auxiliary light switch to the Aux. Lamp Change Over Relay (R5), which is tied to the low beam headlight circuit. The relay sends power over wire 35 to the fog lights. Wire 35 splices into wires 35L and 35R for the left and right lights.
- The fog lights are grounded by wire 0M, then splice with the driving light grounds. The left lights will splice into 0M-A, and the right into 0M-B, which splices into 0M-C and then a ground stud on the right side cowl in the engine compartment. The Change Over Relay is grounded by wire 0R-J.
- Driving lights are turned *ON* by the Aux. Lamp Change Over Relay (R5), which is powered by the Auxiliary light switch, wire 39.
- When changing from low beams to high beams, the headlight dimmer switch powers wire 38 to change from fog to driving lights. Wire 38 energizes the Change Over relay coil, switching from fog lights to driving lights on wire 37. The Change Over Relay is grounded by wire 0R-J.

For more circuit information see “Fog and Driving Lamps, Simplified Schematic” page 33.

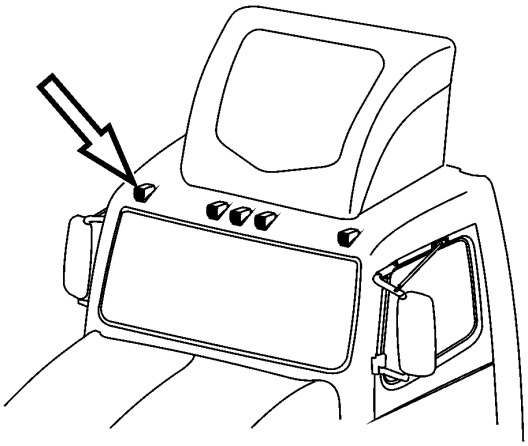
Cab Marker Lamps

Cab marker lights may be one of two different designs. Vehicles without exterior sun visors will have lamps with replaceable, incandescent bulb.

When the sunvisor option is installed, the cab marker lights are sealed LED units. When replacing, the entire LED unit must be replaced.

The front park lamps (front marker) are integrated into the headlamp assemblies. See “Headlamps, Simplified Schematic” page 31 for illustrations and more information.

For circuit information on the marker lamps see “Tail/Marker/Sign/Back-up/Back of Cab Lamps, Simplified Schematic” page 34.



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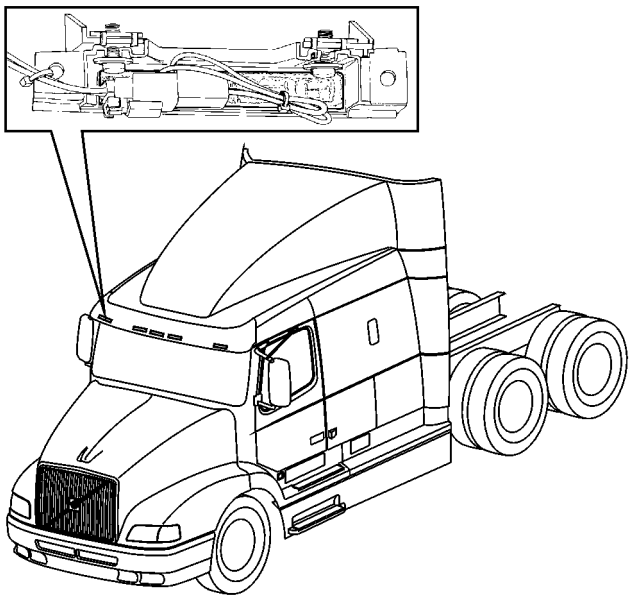


W3004448

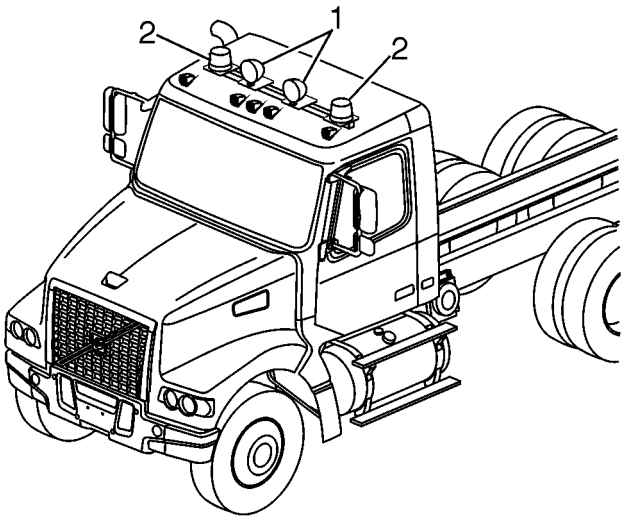
Beacon/Snow Plow Lamps

VHD series vehicles may be equipped with beacon and/or snow plow lights. Single or multiple lights may be ordered. The lights are installed to a mounting bar that is secured to the front of the cab roof behind the marker lights.

Snow Plow lights are used like roof mounted headlamps. A dash mounted switch controls snow plow light operation. With the switch turned “ON,” the snow plow lights are activated and the headlamps turned off. The snow plow lights switch from low to high beam by toggling the headlamp dimmer switch.

The stroke type beacon lights are activated by a dash switch to alert other drivers of a slow or stopped vehicle.

For more circuit information on the beacon or snow plow lights see “Beacon/Snow Plow Lamps, Simplified Schematic” page 35.



W3004447

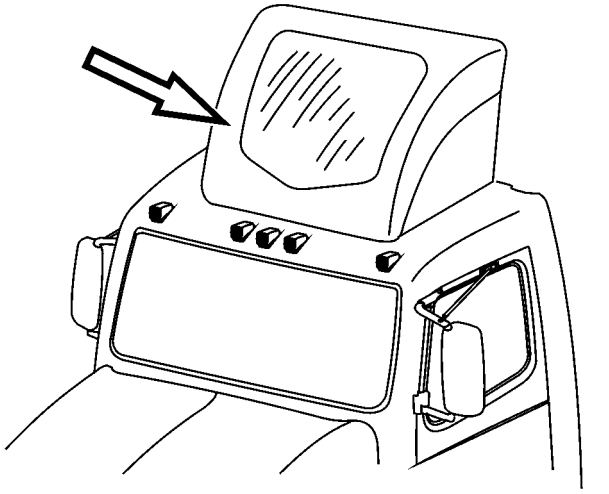
1 Snow Plow Lights

2 Beacon Lights

Sign Lights

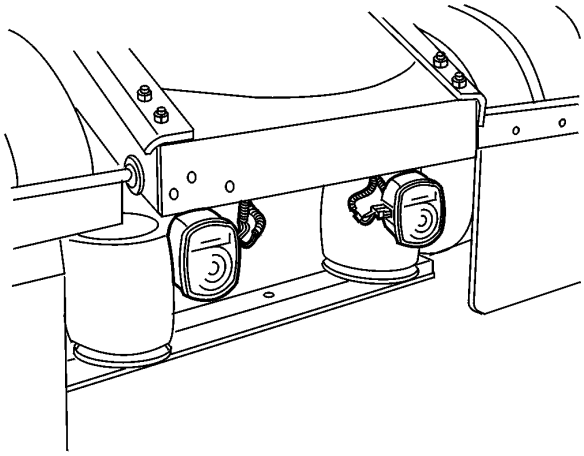
Vehicles with non-integrated roof fairings may be equipped with an optional sign lights. Sign lights are designed with back lighted translucent panels that display company logos. The incandescent bulbs that illuminate the sign are replaceable from behind the air fairing.

For more circuit information on the sign light see “Tail/Marker/Sign/Back-up/Back of Cab Lamps, Simplified Schematic” page 34.



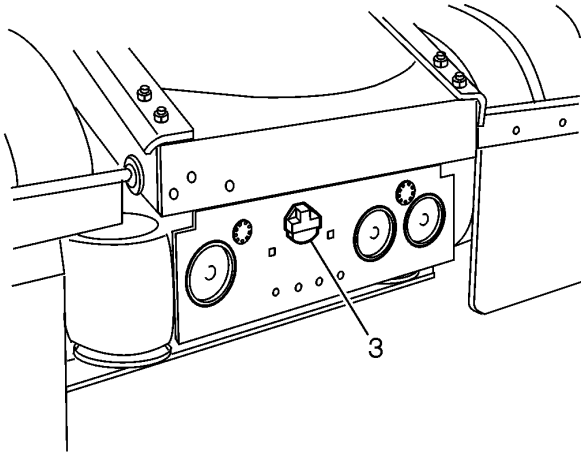
W3004438

Rear Lamps



W3004459

1. Rear Lamps with Replaceable Bulbs



W3004580

2. Rear Lamps with Sealed Bulbs
3. License Plate Light

The rear lamps include tail, stop/turn/hazard, and back-up lamps. The rear lamps may be configured with the standard incandescent bulbs and integrated back up lamps (1), sealed incandescent rear lamps with separate back up lamps (2), or a combination of LED and incandescent lamps. A separate license plate light (3) is sometimes also included in the rear lamps. Other configurations, particularly with body builder applications, may also be produced.

Stop/Hazard/Turn Lamps

The stop, hazard and turn signals all use the same rear bulb filament. For this reason, one lamp request must take priority over the other. The stop signal will override the rear hazard lamps. The rear turn signals will override the brake lamps. The following descriptions will give detailed information on circuit operation for the stop, hazard and turn lamps. To aid in understanding the circuits, see “Stop/Hazard/Turn Lamps, Simplified Schematic” page 32.

Hazard/Turn Lights

- The hazard and turn indicators are powered through a Battery Maxi-fuse through wire 110, which powers the flasher unit. Wire 121 feeds power from the flasher unit to the hazard switch.
- When the hazard switch is *OFF*, wire 111 powers the turn signal switch.
- When the left turn signal is *ON*, power comes through the switch to wires 112 and 115.
- When the right turn signal is *ON*, power comes through the switch to wires 113 and 116.
- When the hazard switch is *ON* (fed by wire 121), wire 122A powers the switch illumination, and power is sent to wires 112 and 113 for the tractor front and trailer turn lights. The hazard switch is grounded by 0J-B.

Stop/Hazard Lights

- The stop and hazard lights are powered through maxi-fuse 11 for circuit IPA-C, which powers fuse 31 for circuit 70. Circuit 70 powers the stop light switch, located behind the instrument cluster.
- From the stop light switch, wire 75 goes to a splice from which wire 75A breaks out to energize the coils for the trailer stop lamp relay. Wire 75B from this splice energizes either the VECU brake input relay (for Volvo engines), or the ECU brake input relay (for all other engines). Wire 75C powers the coils for the tractor stop lamp relay.
- The tractor stop lamp relay (R15) is energized by wire 75C from the stop lamp switch and fuse 31. Relay R15 is grounded by wire OR-L , and to splice pack O, which is grounded to stud #19 below the HVAC unit.
- Battery current travels via wire 76 to relay R15. When R15 is switched on, it opens the circuit between wires 122 and 71. Wire 71 is switched to +12V from wire IPA, via maxi-fuse #11 and fuse 35.
- Wire 71 from Relay R15 provides power to the turn signal switch, sending power to wires 115 and 116 for the tractor rear lamps. The rear lamps are grounded by wire OM-D to a stud on the passenger side cowl in the engine compartment.
- Wire 75B energizes the coil for either the VECU brake input relay (for Volvo engines), or the ECU brake input relay for all other engines. This relay is grounded by wire OR-D which is connected to splice pack O. When R11 is energized, it supplies a ground for either the Vehicle ECU (Volvo engines) or the Engine ECU (all other engines).
- Wire 75A energizes the coil for the trailer stop lamp relay R2. Relay R2 is grounded by wire OR-G, which is connected to splice pack O. When relay R2 is energized, it closes the circuit between wires 72 and 77.
- Wire 77 switches to +12V via circuit IPA, from maxi-fuse #9, and then to circuit IPA-A and fuse 29. From fuse 29, wire 77 feeds power to R2; from relay R2, wire 72 feeds +12V to the trailer stop lamps.

Stop/Hazard Lights with Right Turn Signal On

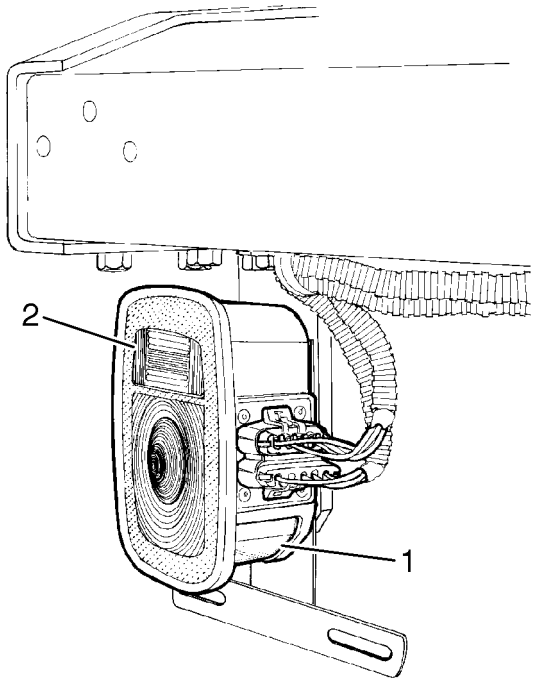
- Wire 113 supplies power to the right front turn light. Ground is through wire 0H-B to a ground stud on the passenger side cowl in the engine compartment. Wire 113 sends a signal to the instrument cluster for the right turn indicator.
- Wire 113 also supplies power to the trailer connector and side repeater. Ground for the side repeater is 0M-A to a passenger side interior ground stud.
- Wire 112 from the flasher unit feeds the left front turn light. Ground is through wire 0H to 0H-A to a passenger side interior ground stud. Wire 112 sends a signal to the instrument cluster for the left turn indicator.
- Wire 112 also supplies power to the trailer connector and side repeater. These lights will continue to flash with the hazard lights on.
- With the right turn switch on, wire 115 will continue to be powered by the stop light circuit. 115 goes to the left tail lamp, which is grounded by 0M-D to a ground stud on the passenger side cowl in the engine compartment.
- The right turn signal will still be powered by wire 111 from the hazard switch. So when the right turn switch is ON, the path from the stop light switch on wire 71 is broken, and the circuit between wire 111 and 116 is completed. Wire 116 feeds the right rear turn signal.
- Ground for the right rear light is on the jumper harness from the right to left rear light, then from the left rear light on 0M-D.
- The left circuit is functionally the same as the right. For more information, see the vehicle electrical schematics.

Tail, License Plate and Back-up Lamp Operation

The tail lamps are powered from the headlamp/parking lamp (master lighting) switch. If the standard rear lamps are installed, the tail lamp also illuminates the license plate through a clear, plastic lens integrated into the bottom of the lamp (1). If sealed rear lamps are used, a separate license plate lamp is installed. In these applications, the wiring is spliced from the tail lamp circuit to power the license plate lamp.

Power for the back-up lamps is supplied through a switch on the transmission. If the standard rear lamps are installed, the back-up lamps are integrated into the top of the lamp (2). If sealed rear lamps are used, a separate back-up lamp is installed.

For more circuit information see “Stop/Hazard/Turn Lamps, Simplified Schematic” page 32.

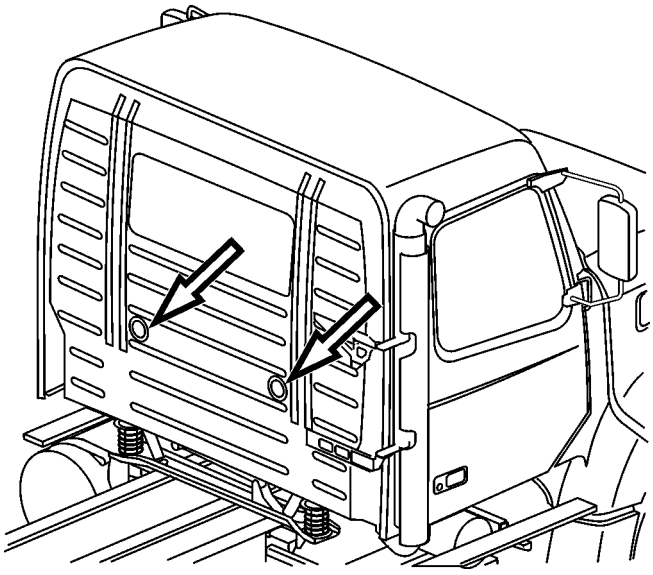


W3004437

Back of Cab Lamps

Back of cab or “spotting” lamps are controlled by a single switch in the left dash switch panel. The back of cab lamps may be configured as either single or dual lamps with low or high mounting locations.

For more circuit information on the Back of Cab Lamps see “Tail/Marker/Sign/Back-up/Back of Cab Lamps, Simplified Schematic” page 34.

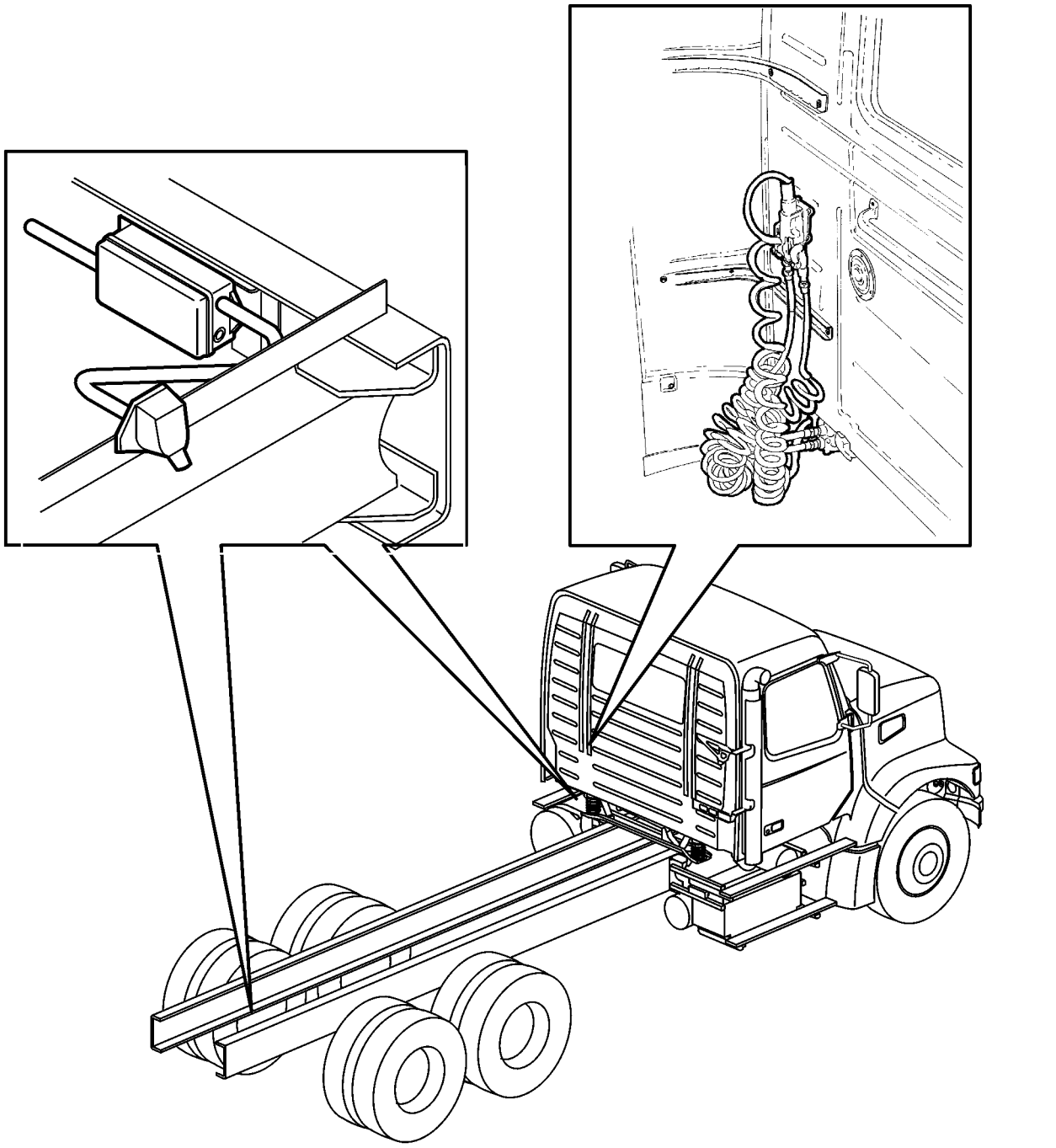


W3004460

Dual back of cab lamp, low mount shown.

Trailer Cable/Junction Box

VN/VHD vehicles provide a lighting to trailers or body builder applications through industry standard color-coded interfaces. The trailer cable is standard interface with tractor applications. Vehicles with body builder applications may be equipped with a lighting junction box. Some applications will have both the lighting junction box and trailer cable. The lighting junction box may be mounted at the left rear of the cab or at the end of the frame.



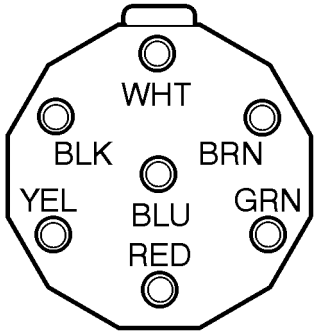
W3004441

The trailer cable, which is the standard interface with tractor applications, is also wired per industry standard pin/cavity locations. An end view of the trailer cable plug with color coding information is shown.

The junction box contains the same 7 wires for rear circuits as the trailer cable. The Volvo circuit numbers for the industry standard wire colors are listed below.

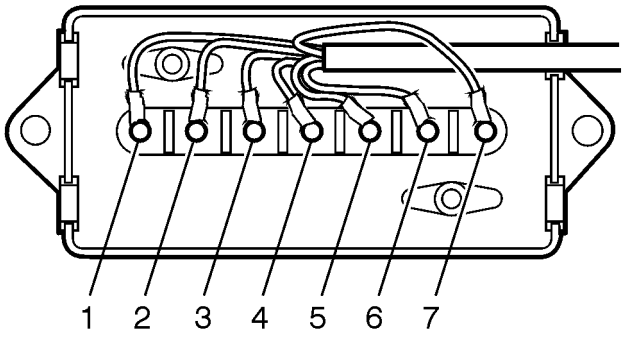
	Color	Circuit #	Description
1	White	OT/O	Ground
2	Black	53	ICC Trailer Maker
3	Yellow	112	LH Turn Signal Light
4	Red	72	Stop Lights
5	Green	113	RH Turn Signal
6	Brown	51	Trailer Marker and Tail Lights
7	Blue	Aux	Auxiliary (12 Volt Ignition Power)

In addition to lighting, the red and blue wires may also be used to power and transmit messages to and/or from the trailer ABS system.



W3004451

Trailer Cable Plug



W3004412

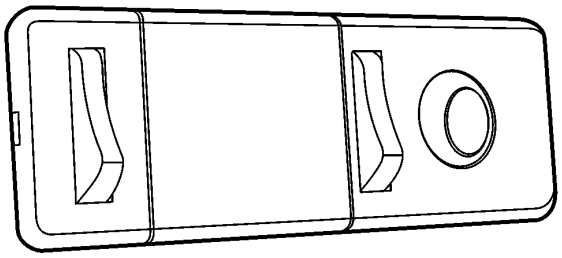
Bodybuilder Junction Box, Inside view

Interior Lighting

Interior/Reading/Luggage

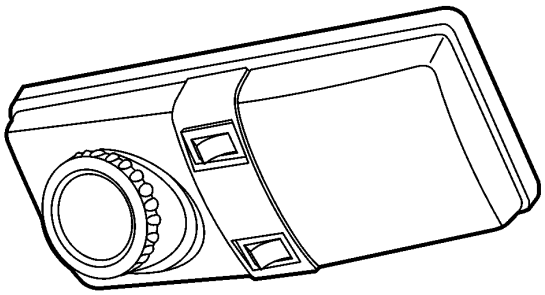
The cab is equipped with separate and combined interior and reading lights in various locations in the cab and luggage compartment. The front seat overhead lights can be turned on at any time using the switch in the fixture. By turning the switch the other way, the light will be activated by the cab door switches.

Note: The design of the interior/reading lamps may vary in different model vehicles. See “Bulb Replacement List” page 29 for replacement bulb information.



W3004409

Flexible Fixture



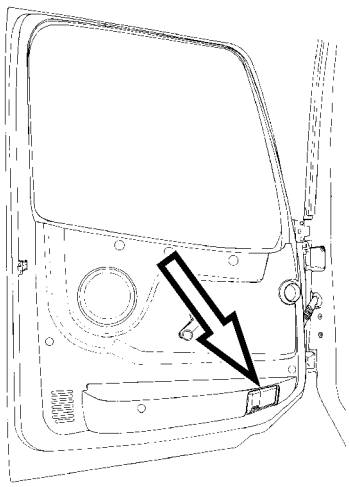
W3004408

Grakon Fixture

Door Lamps

There is a light on the inner front face of the door that can be activated by the switch or be set to come on when the door opens. The lens is red so that the light is used to alert oncoming traffic from the rear that the door is open. It is also used to light the floor area without distracting the operator with a glaring white light.

For more circuit information on interior see “Interior Lamps, Simplified Schematic” page 36 or “Interior Lamps, Simplified Schematic” page 37.

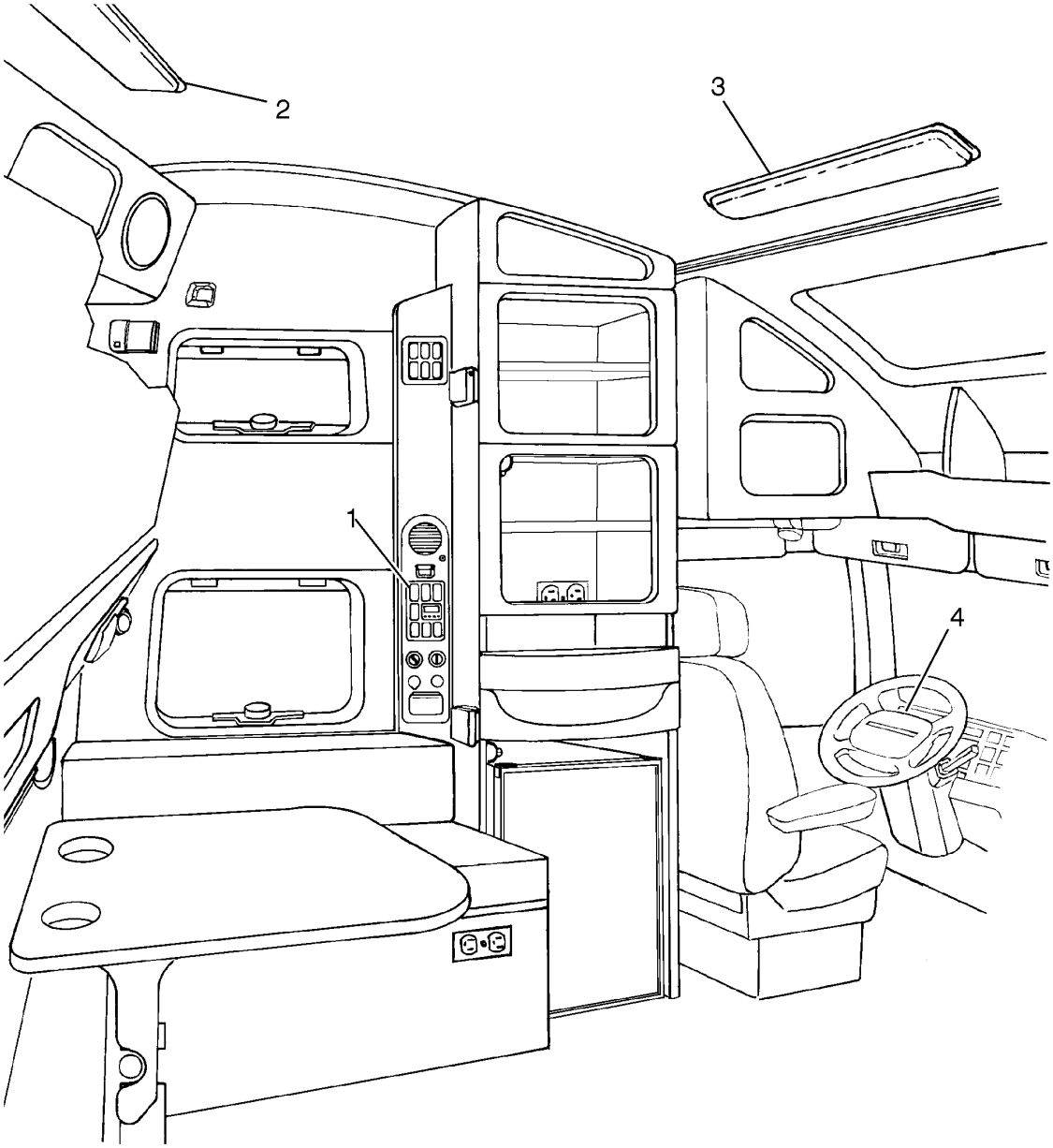


W3004439

Interior Fluorescent Lamps

The VN 610,660 and 770 series vehicles come equipped with sleeper interior (overhead) fluorescent lamps. A switch in the sleeper control panel operates the lamps.

The VN 770 also has a switch located in the left dash switch panel. The sleeper may be equipped with one or two interior fluorescent lamps.



W3004436

Note: VN 770 shown

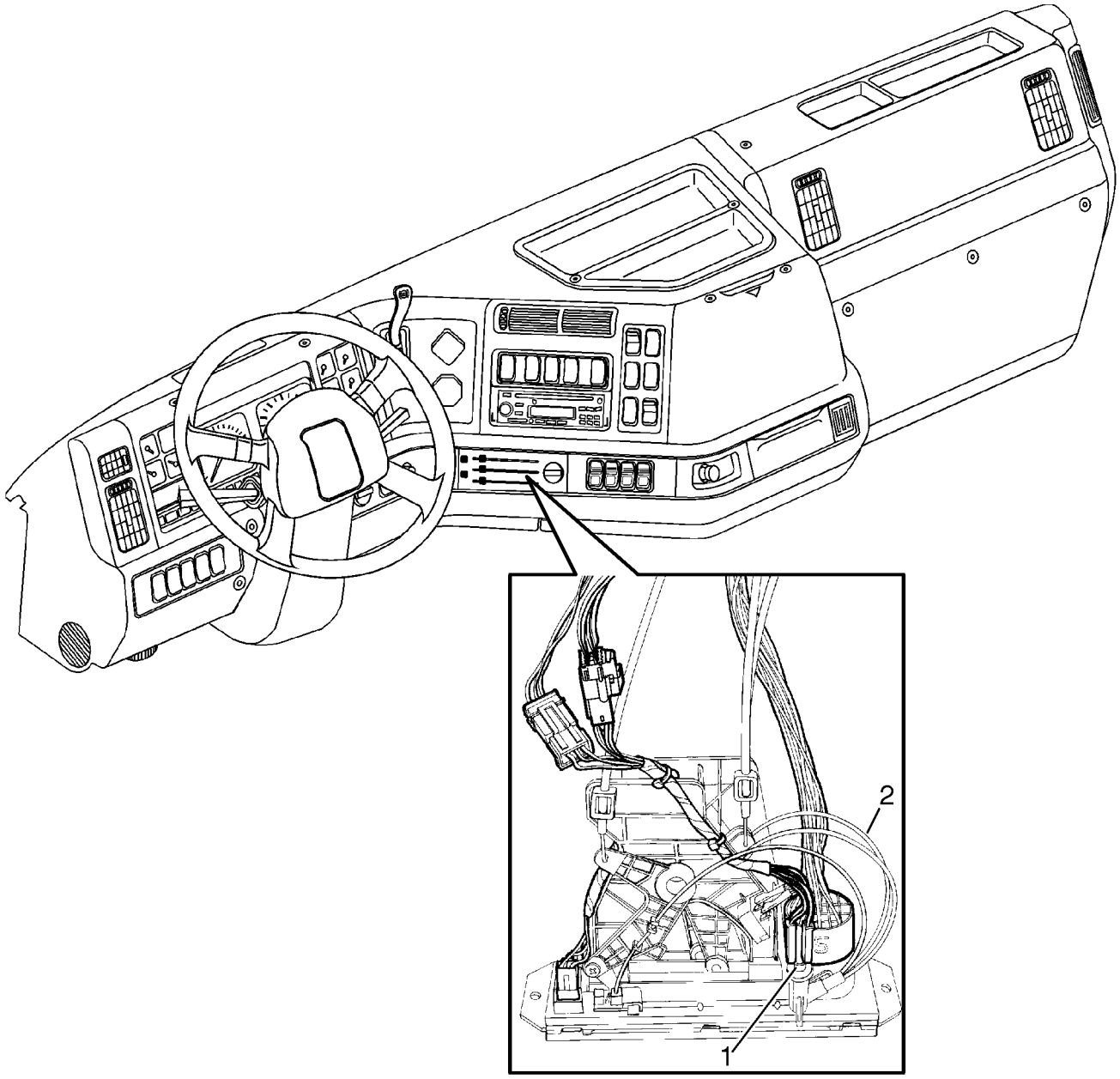
1 Sleeper control panel switch (location similar in VN 610, 660)

2 Interior fluorescent lamp

3 Interior fluorescent lamp

4 Dash panel switch (VN 770 only)

Dash Illumination



W3004440

The headlamp (master light) switch supplies power for dash illumination through the dimmer control switch. The dimmer control switch is a rheostat that allows the driver to control the level of dash illumination intensity. From the dimmer control switch power is distributed to three principal component areas:

Instrument Cluster Illumination

Instrument Cluster backlighting is accomplished through wires 141E, 141F and 141G. One wire goes to each of three instrument cluster modules. The instrument cluster backlighting bulbs are replaceable.

Climate Control Panel Illumination

The climate control panel is illuminated through wire 141A-H. A replaceable bulb assembly (1) illuminates the panel face and supplies light to fiber optic cables (2) that illuminates slide switch knobs.

Switch Illumination

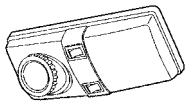
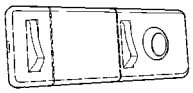
Various individual switches are illuminated by internal LED lights. If the LED lights fail, the entire switch must be replaced. All switch illumination circuits are numbered with 141– numbers.

For more circuit information see “Dash Illumination, Simplified Schematic” page 38.

Bulb Replacement List

CAUTION

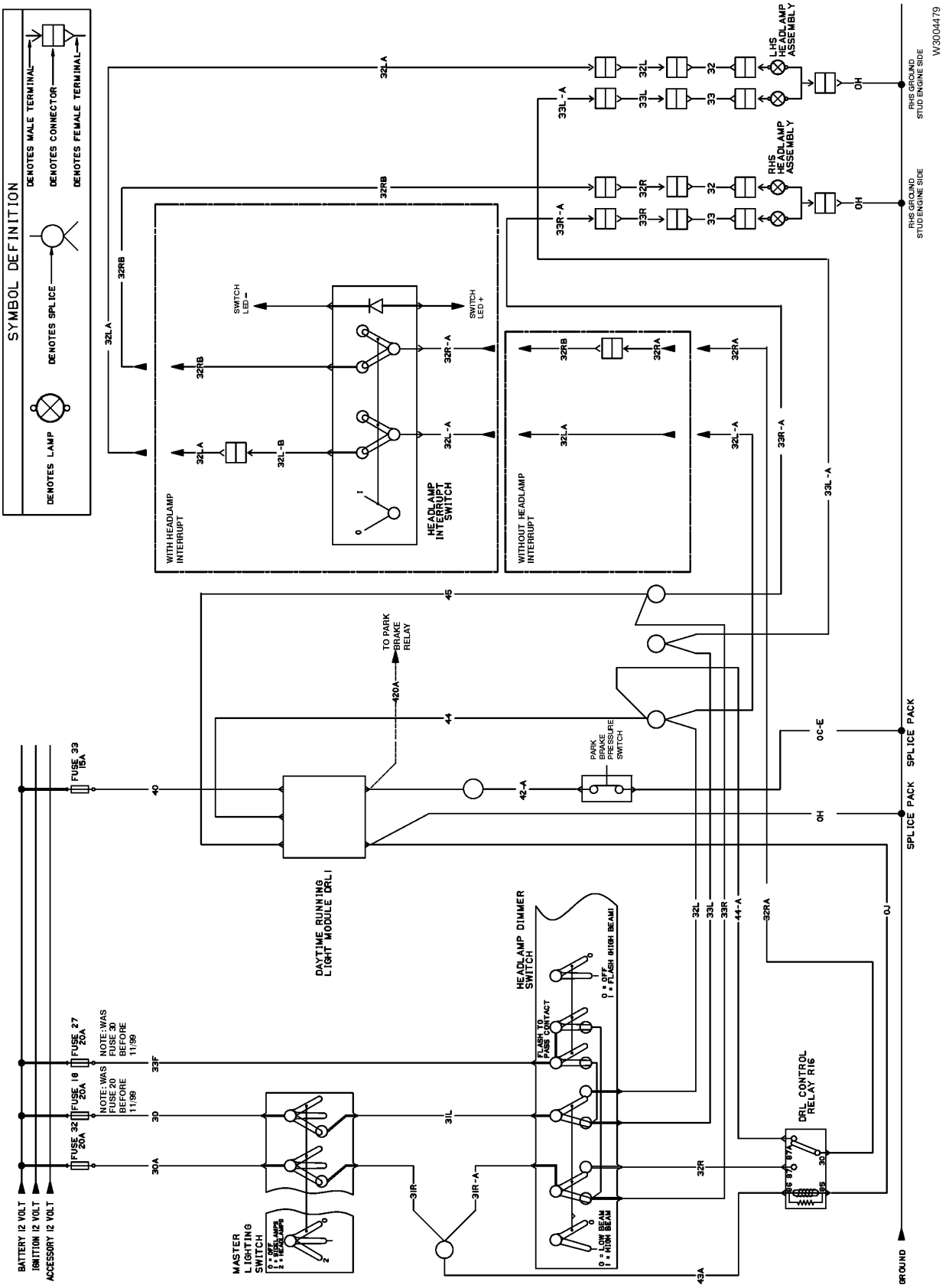
Use of a higher than recommended wattage bulb or any modification to the OEM lens may result in a buildup of excessive heat that may distort or damage the lamp assembly and surrounding area.

Bulb		Trade Number	Volvo Number	Amps
Back of Cab Lamp		1156	3132939	2.1
Back-up Lamp		1156	3132939	2.1
Cab Marker Lamp (without Sunvisor)		67	3132929	0.59
Driving Lamp	VN	H9420	3946923	2.93
	VHD	H3-55	944265	4.58
Fog Lamp	VN	H9415	3946926	3.9
	VHD	H3-55	944265	4.58
Headlamp, High Beam	VN	9007	3098653	5.1
	VHD	H5001-18522	3131227	4.16
Headlamp, Low Beam	VN	9007	3098653	4.3
	VHD	H5006-18523	3132904	2.5
Instrument Cluster Telltale Lamps			982502	0.12
Door Courtesy Lamp		67	3132929	0.59
All Overhead Dome/Spot Lamp	Grakon Fixture 	1057 P21W (dome) 67 (spot)	965826 (dome) 3132929 (spot)	1.75 0.59
	Flexible Fixture 	1057 P21W (dome) 67 (spot)	965826 (dome) 3132929 (spot)	1.75 0.59
Overhead Fluorescent Lamp, Sleeper		PL-L 24W/827/4PP (Phillips) 16944 (GE)	3948411	2.0
Reading Lamp, Under Bunk Storage Compartment		561 (GE)	3919173	0.97
Combined Reading/Spot Lamp, Under Bunk Storage Compartment		561 (GE) (reading) 906 (GE) (spot)	3919173 (reading) 3946947 (spot)	0.97 0.69
Luggage Compartment Lamp		1156	3132939	2.1
Side Repeater		1156	3132939	2.1

Bulb		Trade Number	Volvo Number	Amps
Turn Signal Lamp (front)	VN	3357	3132941	2.2
	VHD	1157 amber		2.1
Turn Signal Lamp (rear) /Stop Lamp		1157	3132940	2.1
Rear Marker Lamps /License Plate Lamp		1157	3132940	0.59
Snow Plow Light		6014	3132921	4.7
Beacon Light		92711 (Truck-Lite)		0.5

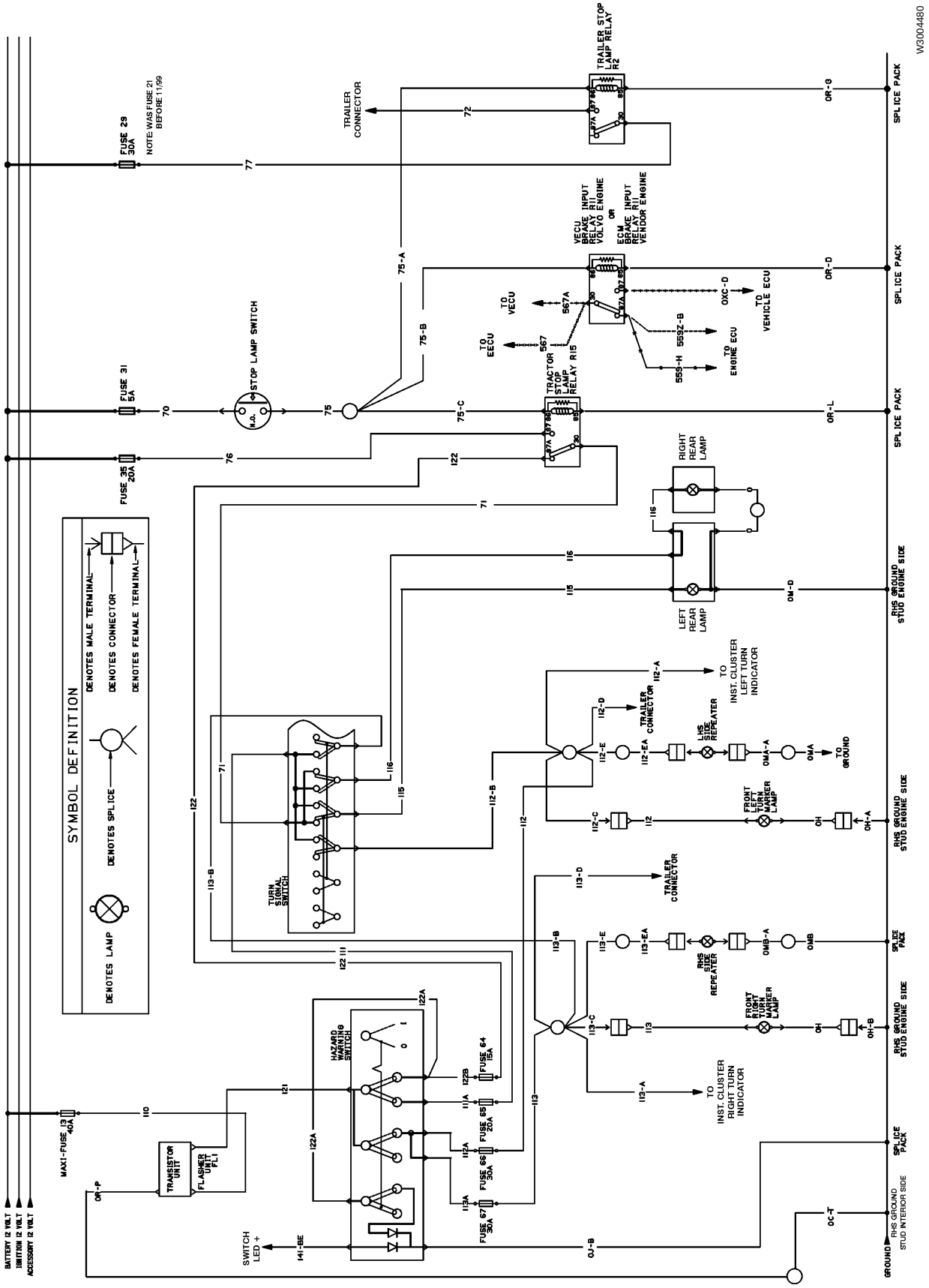
Headlamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry. For detailed, vehicle-specific schematics see "VN/VHD Series Electrical Schematics" in group 37. See the fuse location decal in the vehicle for fuse information.



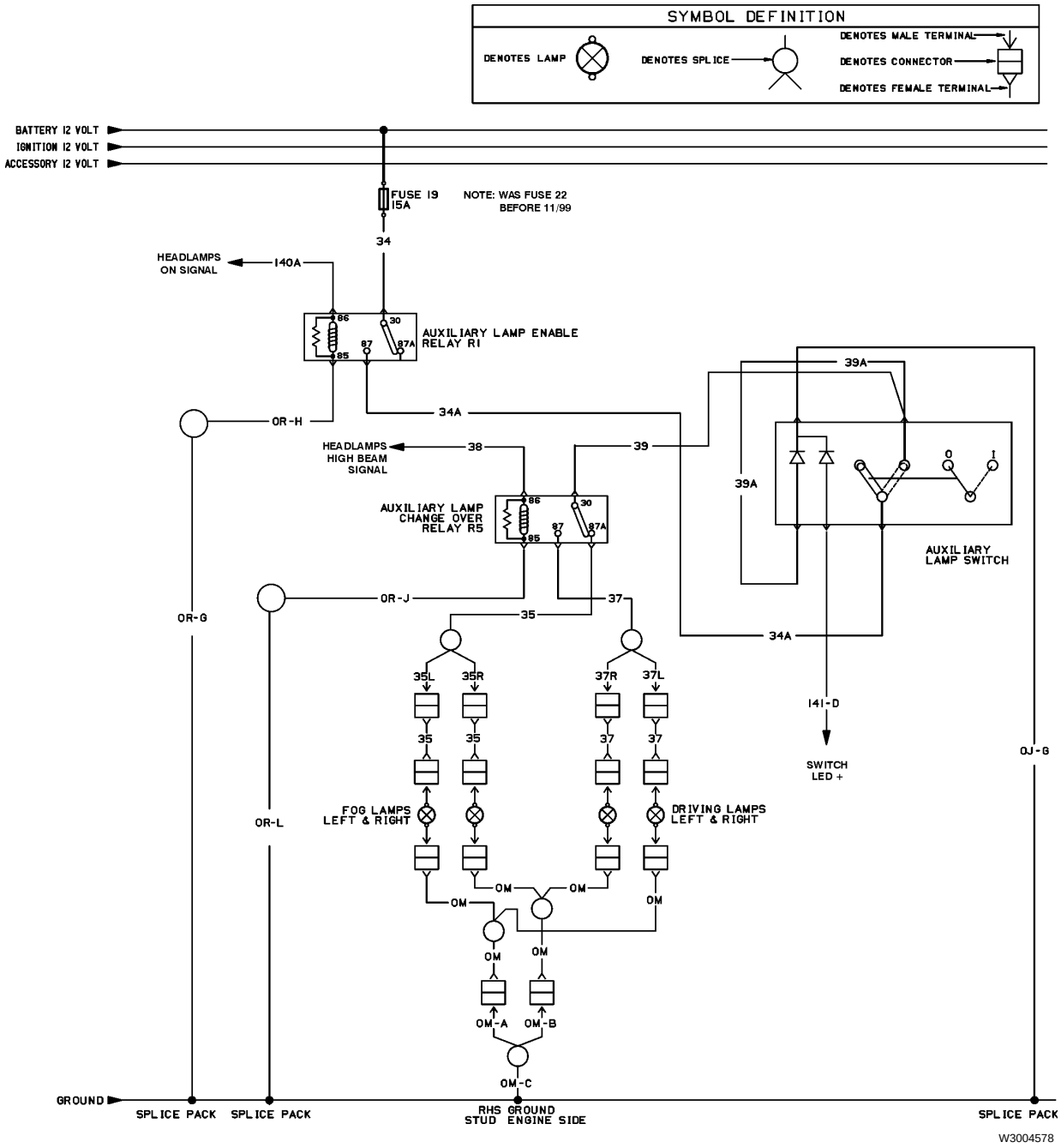
Stop/Hazard/Turn Lamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry. For detailed, vehicle-specific schematics see "VN/VHD Series Electrical Schematics" in group 37. See the fuse location decal in the vehicle for fuse information.



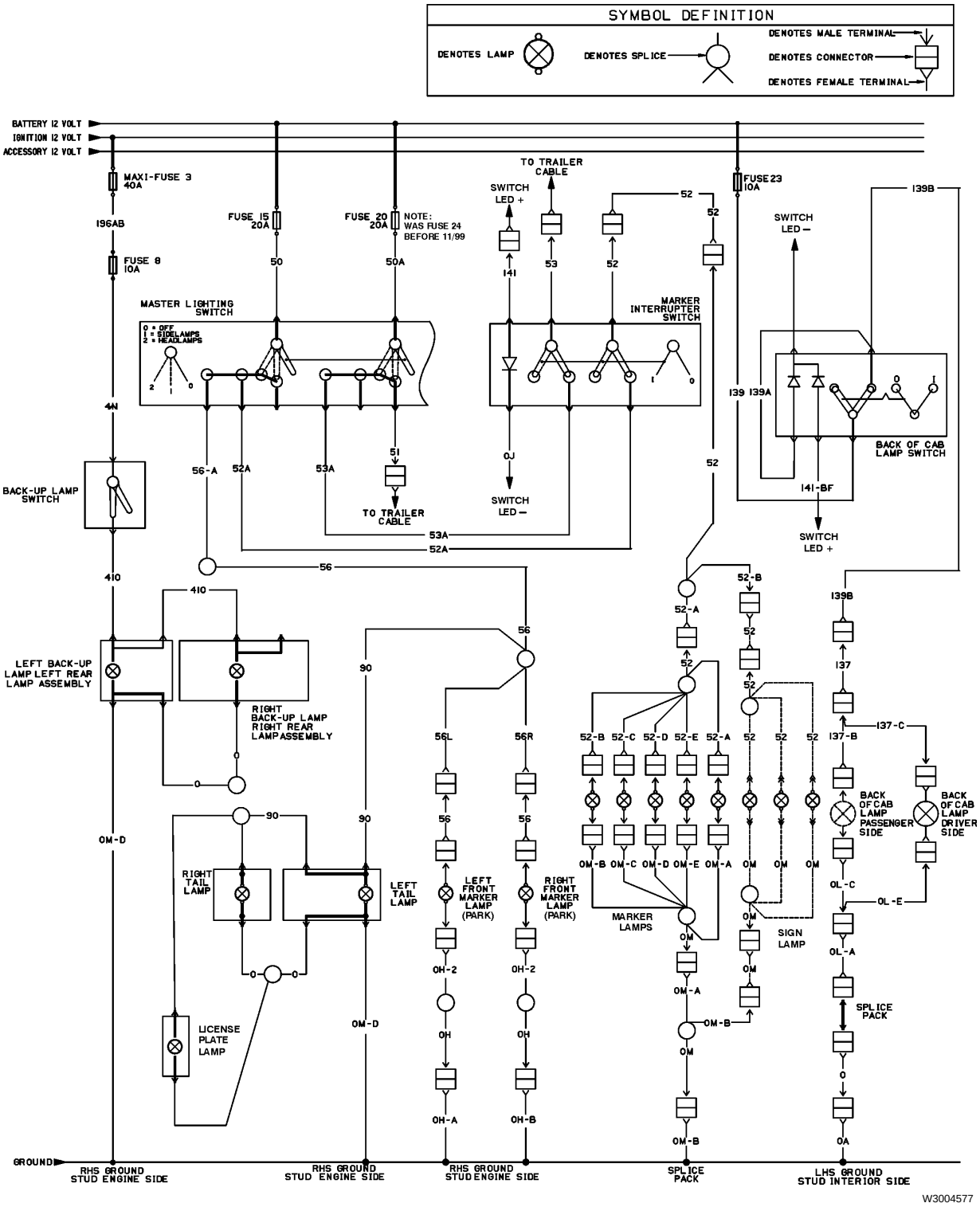
Fog and Driving Lamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry. For detailed, vehicle-specific schematics see “VN/VHD Series Electrical Schematics” in group 37. See the fuse location decal in the vehicle for fuse information.



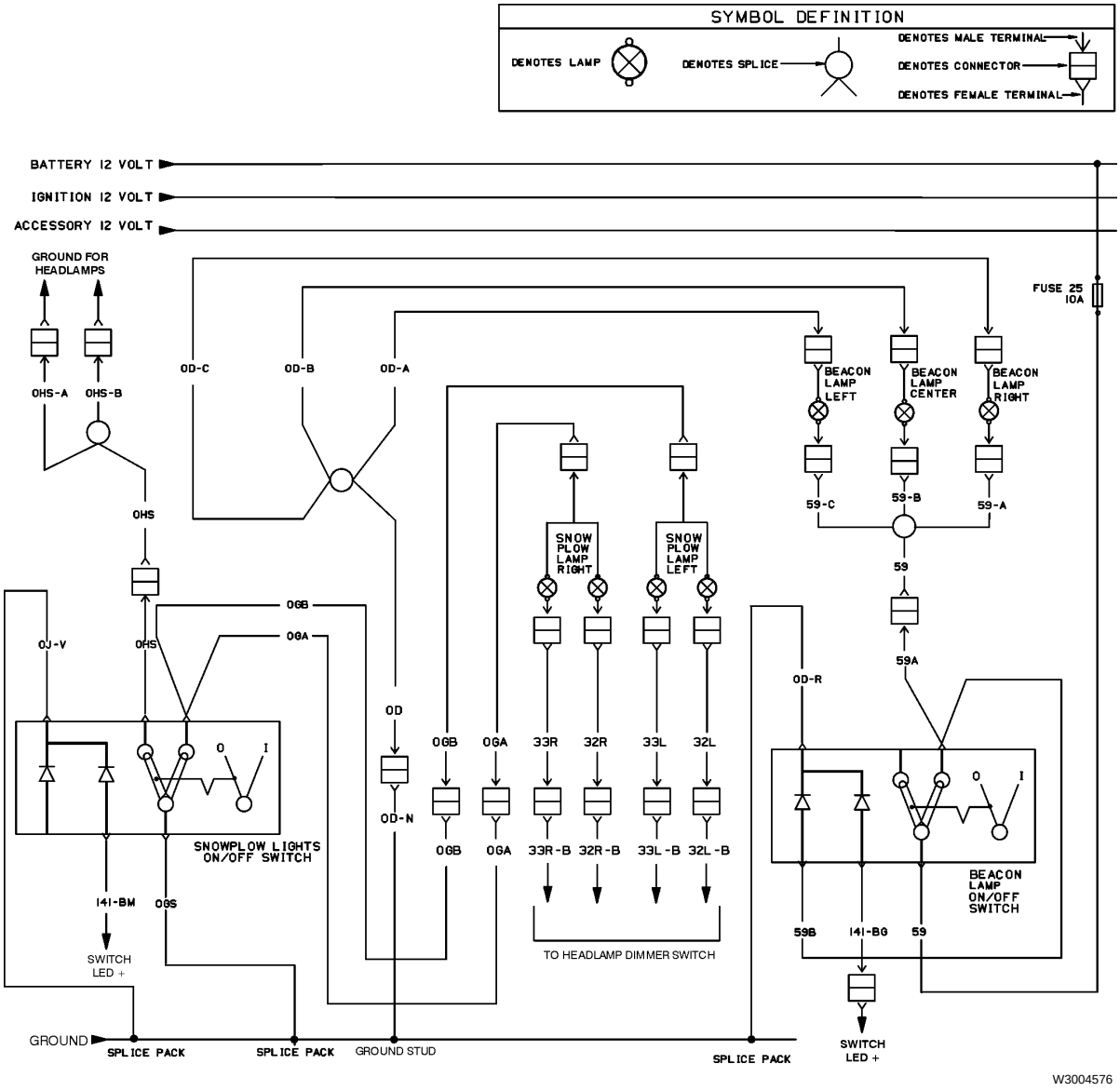
Tail/Marker/Sign/Back-up/Back of Cab Lamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry. For detailed, vehicle-specific schematics see “VN/VHD Series Electrical Schematics” in group 37. See the fuse location decal in the vehicle for fuse information.



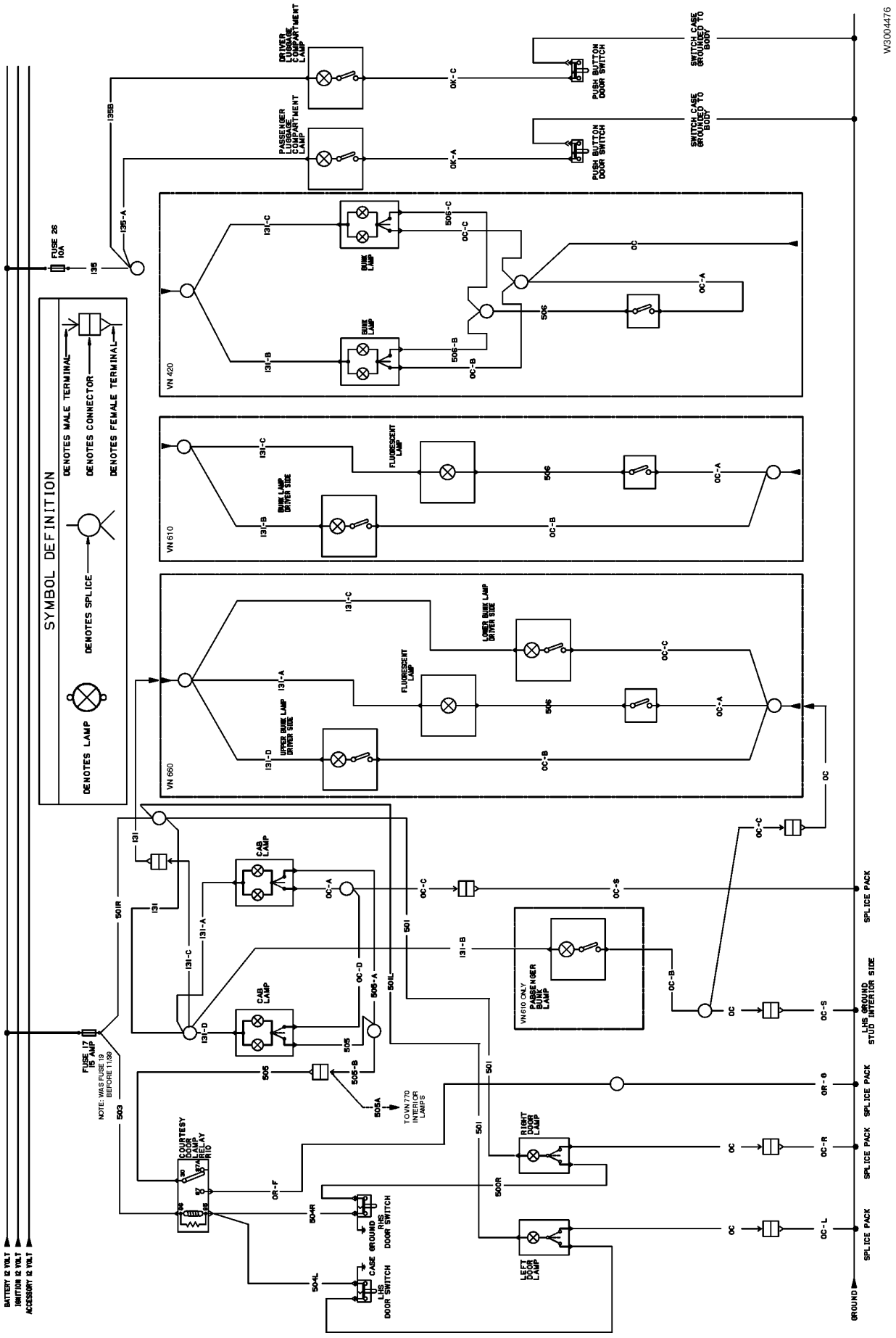
Beacon/Snow Plow Lamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry. For detailed, vehicle-specific schematics see “VN/VHD Series Electrical Schematics” in group 37. See the fuse location decal in the vehicle for fuse information.



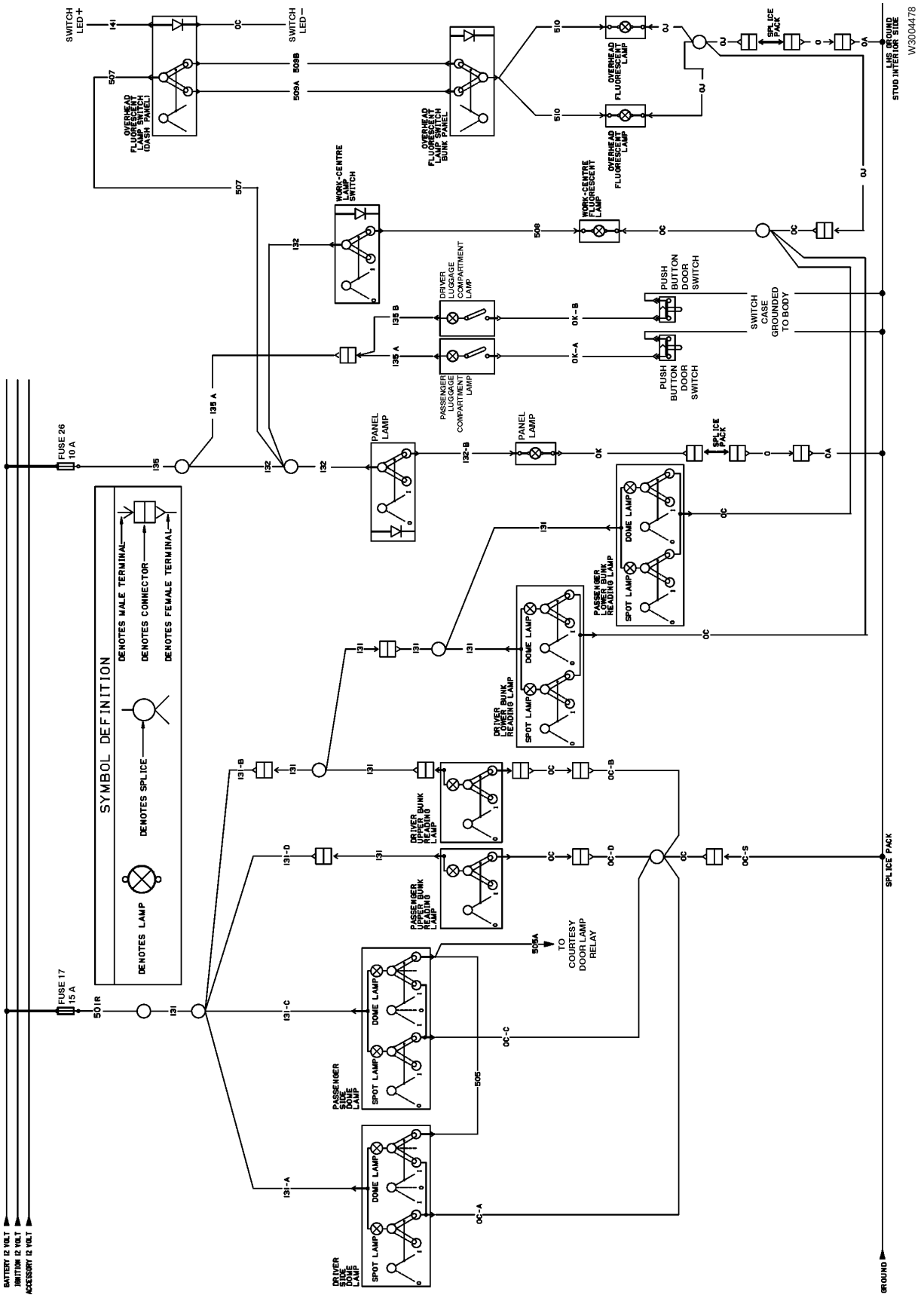
Interior Lamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry (with the exception of the VN770). For detailed, vehicle-specific schematics see "VN/VHD Series Electrical Schematics" in group 37. See the fuse location decal in the vehicle for fuse information.



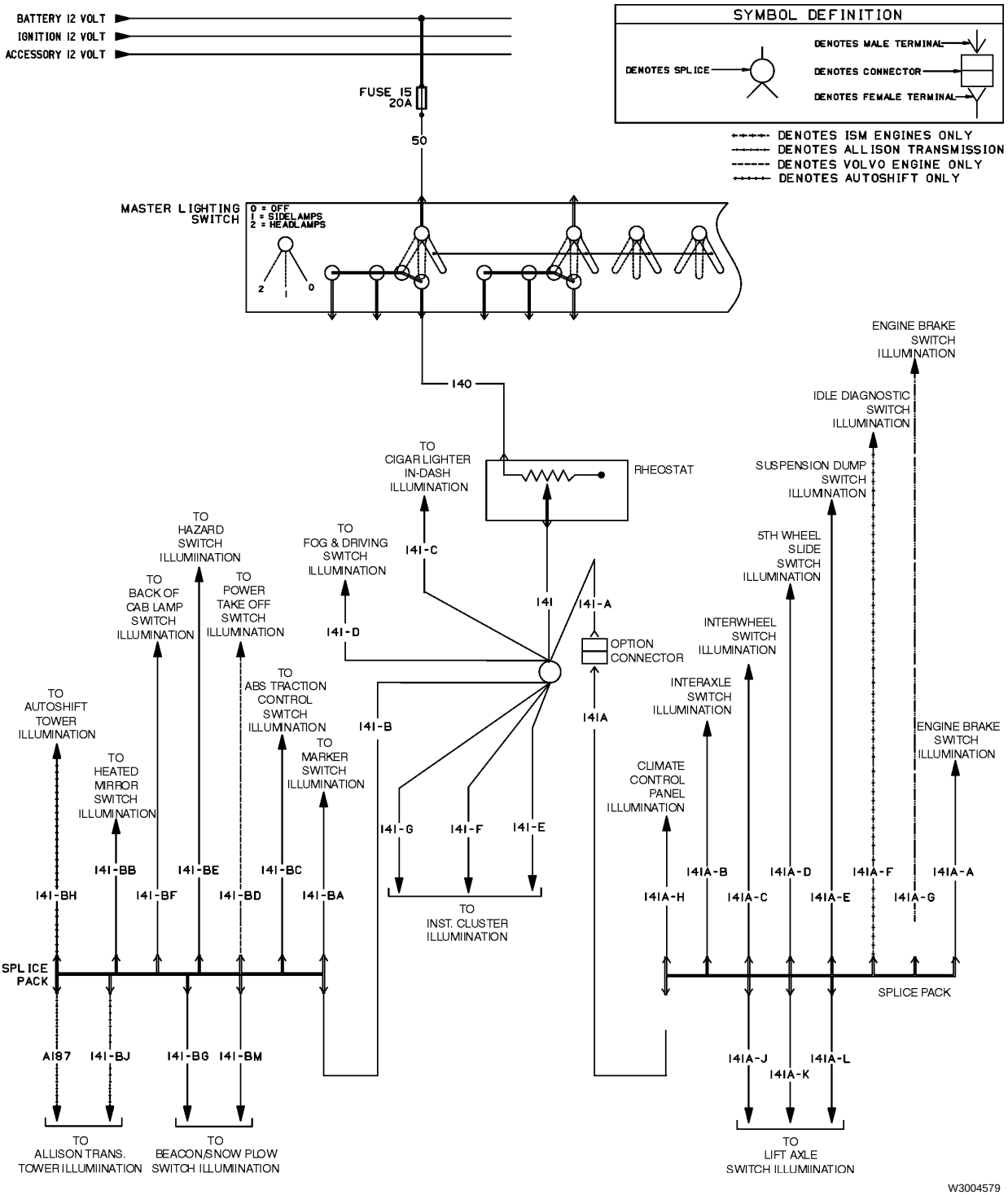
Interior Lamps, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN770 circuitry. For detailed, vehicle-specific schematics see "VN Series Electrical Schematics" in group 37. See the fuse location decal in the vehicle for fuse information.



Dash Illumination, Simplified Schematic

This simplified schematic should only be used to help clarify the design features of the VN/VHD circuitry. For detailed, vehicle-specific schematics see “VN/VHD Series Electrical Schematics” in group 37. See the fuse location decal in the vehicle for fuse information.



Troubleshooting

Lighting System

Lighting failures occur for a variety of reasons. Age of the bulb or light assembly, physical damage, road vibration, weather conditions and poor maintenance practices all contribute to lighting failures.

Wiring

Power and ground supply circuits must be intact for lighting systems to function properly. Power supply circuits originate at fuses, then route through a complex maze of switches, wiring and connectors before power is delivered to the lamp assembly. Ground may be supplied through an equally complex circuit. An understanding of wiring circuit architecture and the ability to read and understand wiring schematics is essential to troubleshooting lighting problems. The simplified schematics and switch logic diagrams found in this manual are used primarily to illustrate the design features of the VN/VHD lighting system, however they may be used for limited troubleshooting. For detailed, vehicle-specific schematics see 'VN/VHD Electrical Schematics, Group 37."

The following guidelines should be observed when troubleshooting wiring problems:

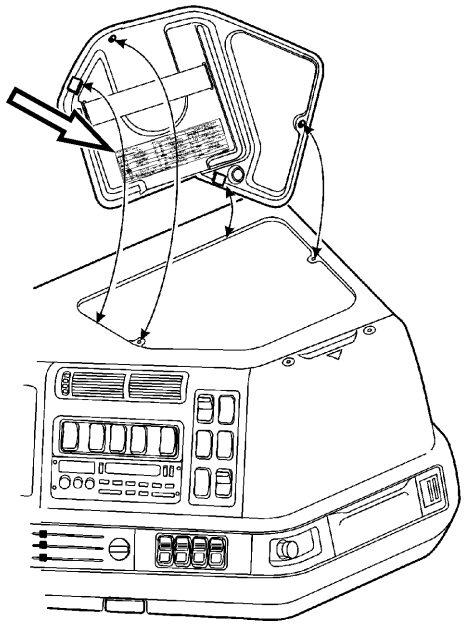
- Use of a Digital Multimeter (DMM), such as the Fluke 87, is recommended for troubleshooting lighting problems.
- The use of incandescent test lights is not recommended.
- Never pierce wiring insulation with test probes. Moisture "wicked" into wiring will cause future corrosion problems.

For detailed instructions concerning the troubleshooting of wiring, connectors, switches and wire repair methods see "Electrical General, VN from 2–98 and VHD" Group 30.

Fuses

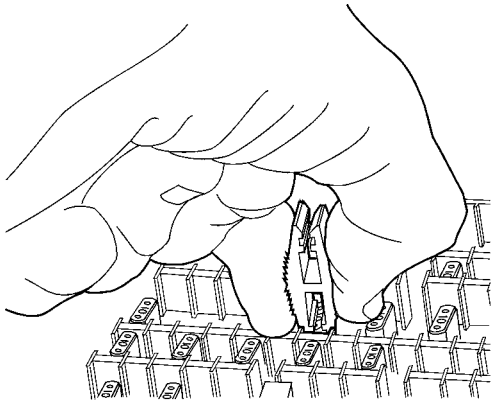
Fuses protect all lighting circuits. Fuses are designed to interrupt current flow in overloaded circuits. If a fuse fails, always investigate the cause of failure.

Each vehicle is equipped with a decal attached to the Truck Electrical (TEC) top cover. This decal gives the specific location, size and function of each fuse. **Always consult this decal for the most accurate fuse location information for the specific vehicle being serviced.**



W3004442

Use fuse puller tool 20378326 to remove mini-fuses from the TEC center. Removal of mini-fuses with another device can possibly damage TEC center connections.



W3002525

Lens Failure

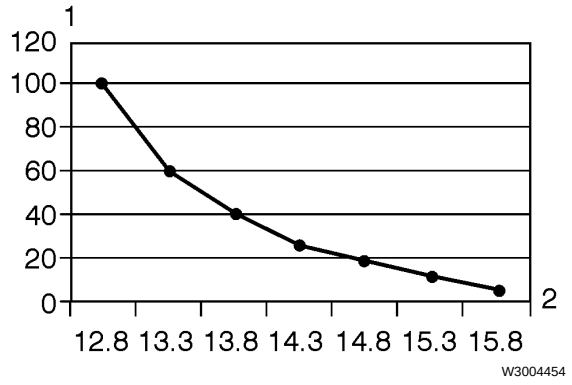
Lens failure not only compromises light quality, but also allows moisture and debris to attack the bulb. The most obvious causes for lens failure is physical damage. However, over-tightening, chemical impact and even dirt can also cause lens damage. Prevent stress cracks caused by over-tightening by securing lens screws with minimal torque.

When plastic lenses are exposed to incompatible chemicals, the chemicals penetrate the plastic and “unhook” the long chain of molecules that make the plastic strong. A lamp that is under stress may then crack at its weakest point. Many chemicals used in vehicle maintenance such as body cleaners, lubricants, paint, paint thinners, antifreeze, brake-fluid, etc. may be incompatible with lamp assembly plastics. Generally, a mild soap and water solution should be used to clean the lamp/lens assembly.

A dirty lens will not allow proper heat dissipation and thereby shorten lamp life. Encourage the vehicle operator to take the time to regularly clean the lamp’s lens.

Excessive Voltage

Excessive voltage or voltage surges is a major factor affecting bulb life. It has been determined that as little as 1 volt over the design voltage can reduce bulb filament life expectancy by more than 50 percent.



1 Bulb Life Percentage
2 Voltage

Some factors that may cause excessive voltage or voltage surges include:

- Poor grounding.
- Alternator voltage regulator setting too high.
- Cranking the vehicle with the lights on.
- Cranking the vehicle with the lights on while using high output battery “boosters” to assist starting.

Loss of Bulb Contact

Corrosion or the loss of spring tension in the bulb socket may cause loss of bulb contact with the wiring socket connectors.

To help prevent corrosion, dielectric grease may be applied to non-sealed bulb contacts and bases. The dielectric grease will help seal the contacts and bulb base from the corrosive effects of moisture. Dielectric grease may also be applied to non-sealed type lighting connectors. A lamp lens that is properly installed and free from defects will also help prevent corrosion.

A bulb socket that has lost its spring tension should be replaced.

Bulb Failure Analysis

Due to their solid state construction, there is no effective way to determine the cause of a failed LED light by observing its condition. However, the probable cause of incandescent bulb failure may be determined by close observation of the bulb.

- A bulb with stretched and broken filaments probably failed due to shock and vibration.
- A bulb with a yellow, white or blue film inside the bulb indicated that the bulb’s glass enclosure has leaked.
- A bulb that has failed due to old age will have a dark, metallic film.

Heat

Because heat can accelerate bulb failure, try to insure lamps operate more coolly by observing the following recommendations:

- Never use a bulb that has a wattage higher than what is recommended.
- Never modify the OEM lens.
- Keep the lens clean.
- Avoid parking against a dock with the lights “ON.”

Video Tape

For more troubleshooting and failure analysis information, a video tape titled “Why Lights Fail, A Personal Guide to Longer Life and Lower Cost for Vehicle Lighting Systems” and produced by Truck-Lite Corporation is available by calling 1–800–562–5012 or by visiting their web site at www.truck-lite.com.

Service Procedures

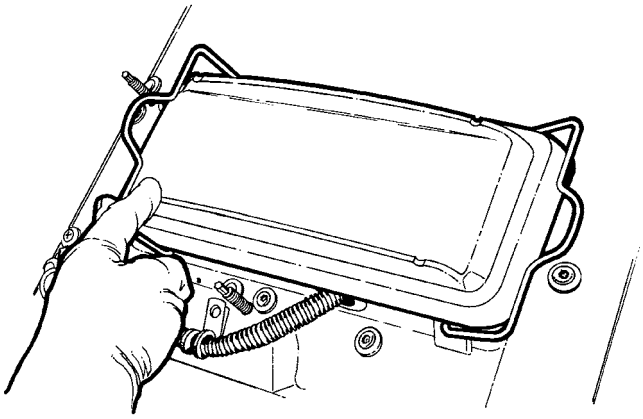
3511-03-02-01 Headlamp Bulb, Replacement

VN

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

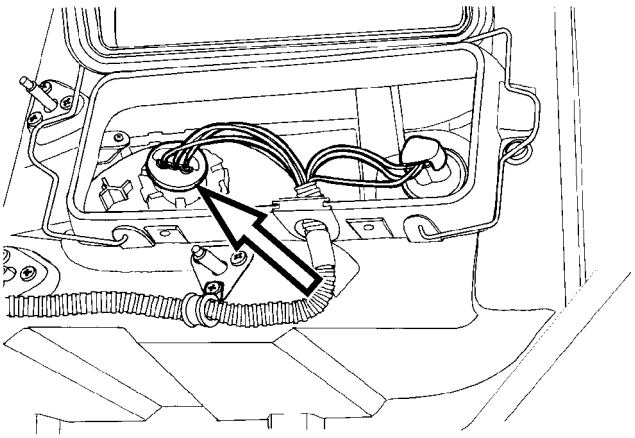
1



W8001104

Remove the dust cover from the rear of the headlight assembly.

2



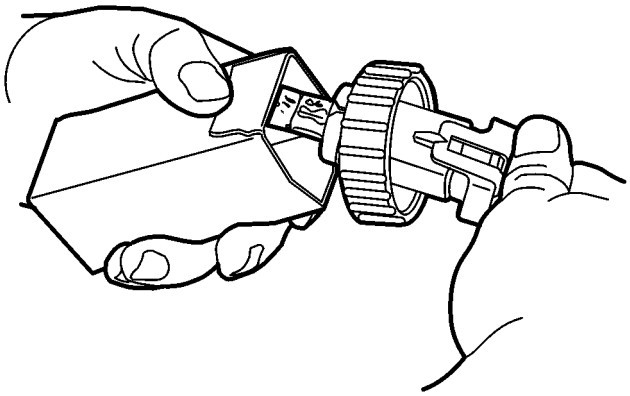
W3004382

Disengage the lock and remove the terminal connector from the bulb assembly.

3

Turn the lock ring counter-clockwise to disengage, and pull out the bulb assembly.

4



W3004383

Note: Do not touch the replacement bulb glass with fingers or allow the glass to be contaminated. Failure to keep the glass clean will shorten its service life.

Carefully remove the replacement bulb from the box. Use caution not to touch the bulb glass. Properly align the mounting tabs and install the bulb assembly into the socket. Push in until it is fully seated. Install the lock ring.

5

Install the terminal connector. Check that the locking tab is secure.

6

Install the dust cover.

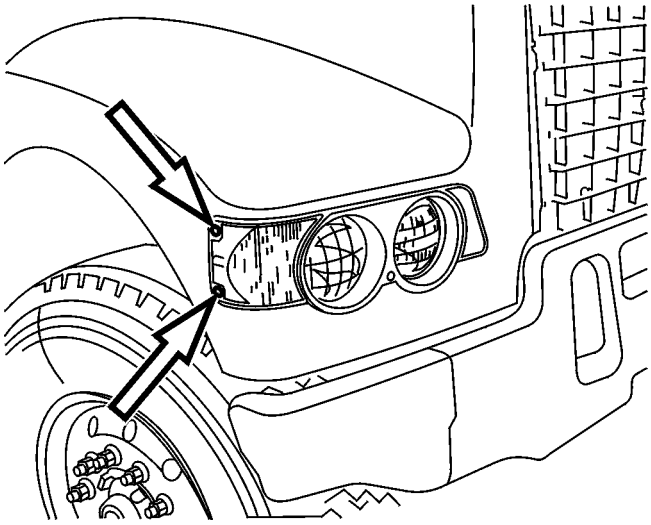
3511-03-02-01
Headlamp Bulb, Replacement

VHD

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

1



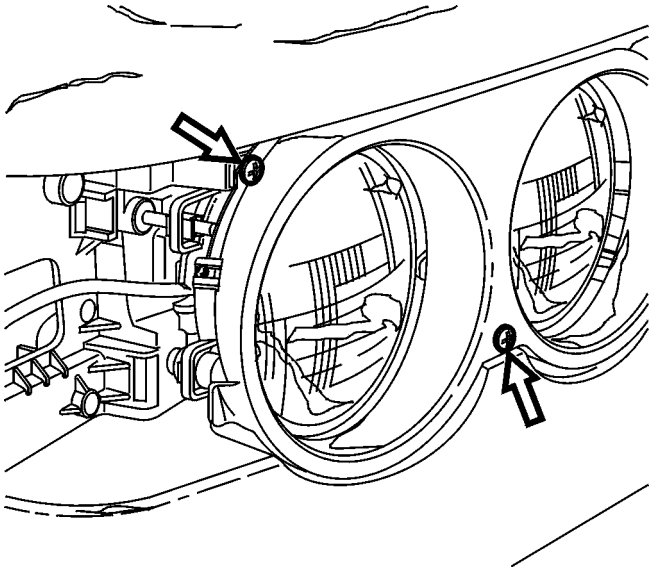
W8002698

Remove the two mounting screws that mount the turn signal assembly. Pull the turn signal assembly straight out to the side.

2

Twist the turn signal light socket until unlocked. Remove the turn light signal assembly.

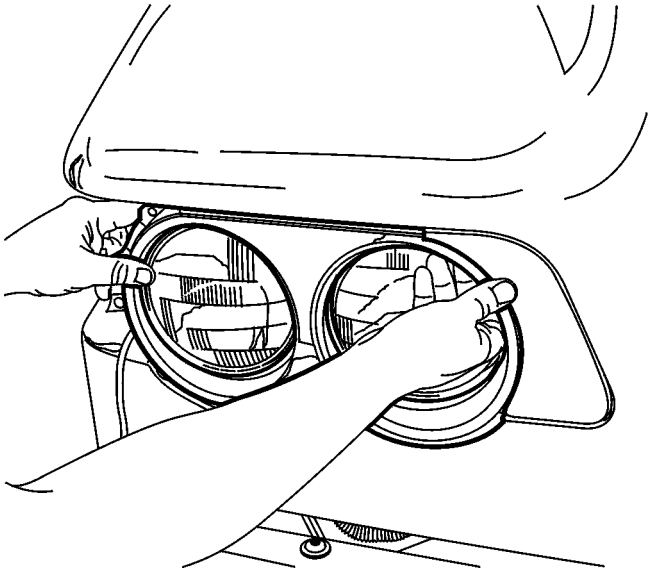
3



W8002699

Remove the two trim bezel mounting screws.

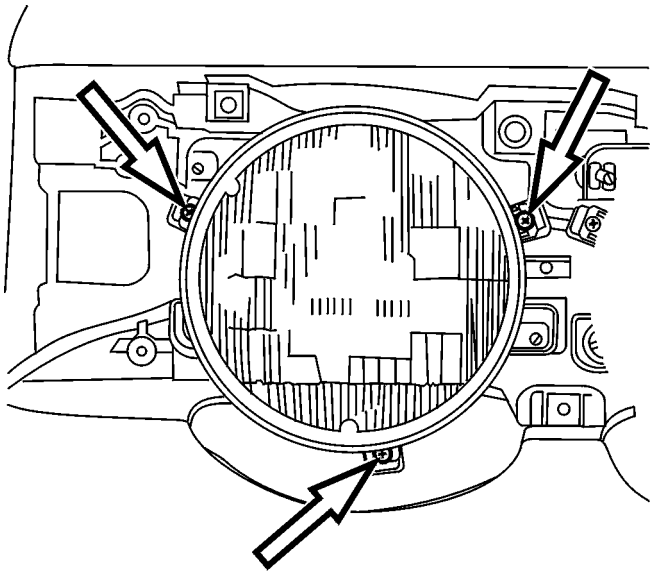
4



W8002716

The bezel is now held in place by a plastic post and socket fasteners. Pull straight out on the bezel to remove.

5



W8002702

Remove the three screws from the retaining ring that holds the headlamp in place.

6
Pull the bulb out and disconnect the connector on the back of the bulb.

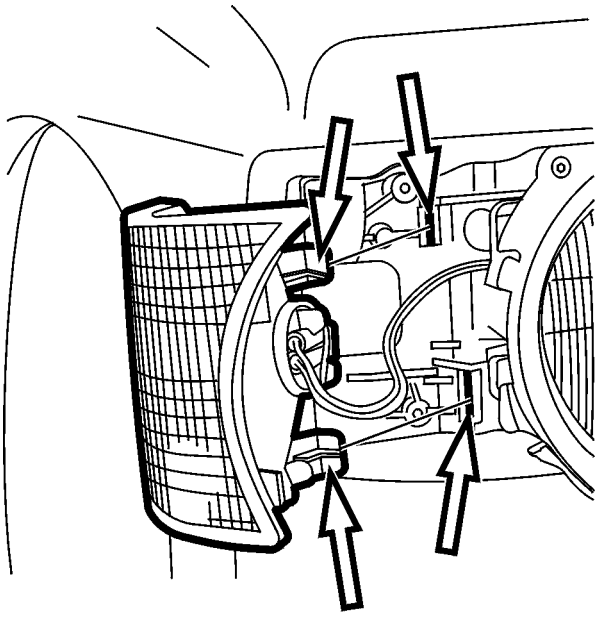
7
Connect the replacement bulb with seal and position it in its mounting location.

8
Install the mounting retaining ring and tighten the three mounting screws.

9
Position the trim bezel into place and push until the bezel tabs snap into position. Tighten the two mounting screws.

10
Install the light socket into the turn signal assembly. Twist the light socket until it locks in place.

11



W8002700

Slide the turn signal assembly from the side into the housing tabs.

12
Tighten the two mounting screws.

3521-05-02-01 Headlamp, Adjustment

VN

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Note: The Hoppy headlight aimer kit, J-25300–D, is recommended for aiming VN/VHD headlamps. See “Lighting System, Special Tools” page 5.

Vehicle Preparation

Before beginning the headlamp adjustment process, prepare the vehicle:

1
Drive the vehicle onto a flat surface. It isn’t necessary that this surface be exactly level.

2
Remove any large amounts of mud or ice from the underside of the fenders.

3
Check tires for noticeable deflation. Inflate if necessary.

4
See that there is no load in the vehicle other than the driver.

5
Rock the vehicle to equalize the springs. Check them for sag or broken leaves.

6
Make sure that the cab suspension and the Volvo air suspension are fully inflated and that the air system pressure is 90 psi or higher.

7

CAUTION

Some solvents and cleaners will attack and/or weaken the components of the B4A aimer. Thoroughly dry any object which has been cleaned with a solvent before attaching an aimer to it.

Clean the headlamp lenses and aiming pads.

8
Check for bulb burnout, broken aimimg pads and proper beam switching.

9
Check that the hood is closed completely and is latched on both sides.

Floor Slope Calibration

Note: The headlamp aimers will not work correctly unless floor slope is taken into account. Calibration of floor slope should be done prior to aiming. However, if you regularly use one area to aim headlamps, rechecking floor slope is unnecessary. Permanently mark the area, calibrate the slope for that area and mark the setting for future reference.

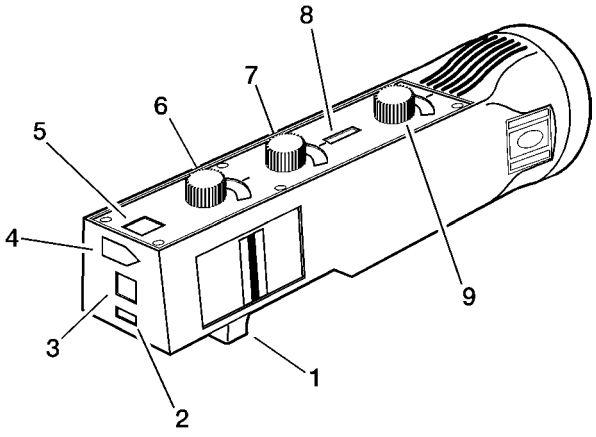
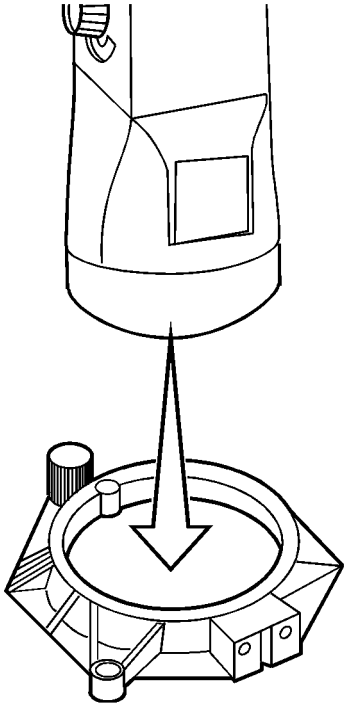


Fig. 1: B4A Aimer Unit

1 Piston Handle
2 Level Vial Bubble
3 Top Port Hole
4 Unit Identification
5 Horizontal Aim Port Hole
6 Horizontal Aim Dial
7 Vertical Aim Dial
8 Vertical Aim Vial Bubble
9 Floor Level Dial

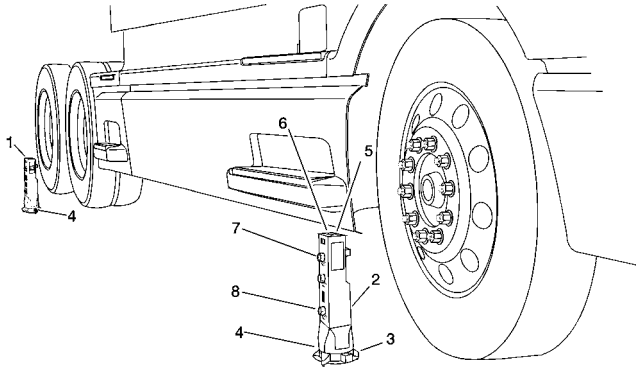
1



W3004582

Attach Calibration Fixtures to aimers. The fixtures will easily snap into place when properly positioned.

2



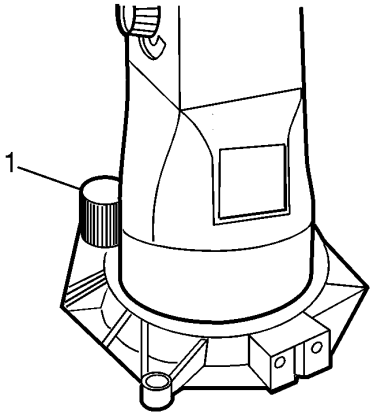
W3002350

Fig. 2: Floor Calibration (on passenger side only)

1 Unit A (rear tire)
2 Unit B (front tire)
3 Calibration Fixture
4 Thumb Adjusting Screws
5 Level Vial Bubble
6 Top Port Hole
7 Horizontal Dial
8 Floor Level Dial

Place aimers at the center line of each wheel on the passenger side of the vehicle. *Unit B must be placed at the front wheel on the passenger side with the target facing to the rear. Unit A must be placed at the rear wheel on the passenger side with the target facing front.*

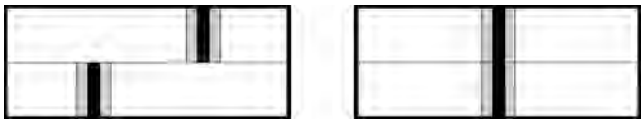
3



W3004536

Level each unit by turning the thumb adjusting screw (1) on each calibration fixture. Turn the screw either clockwise or counter-clockwise until the level vial bubble registers in a centered, level position.

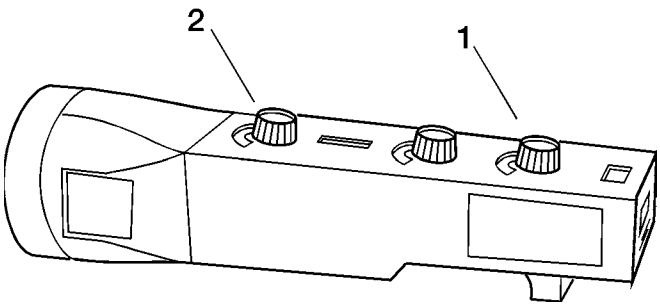
4



W3002344

Look into the top port hole of Unit A. Turn the horizontal knob until the split image is aligned.

5



W3002359

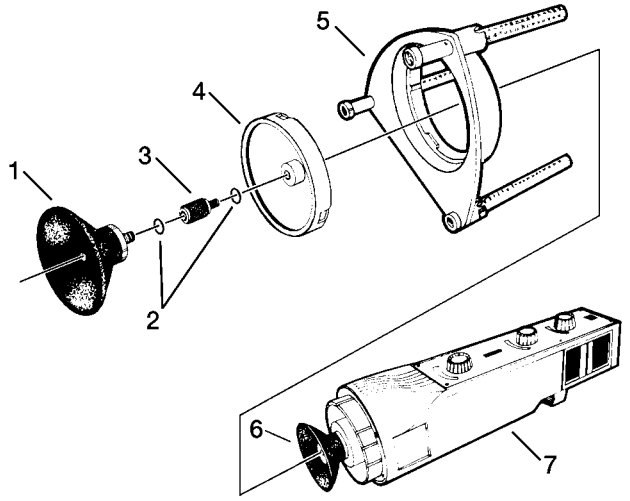
1 Horizontal Dial
2 Floor Level Dial

Transfer the plus or minus reading indicated on the horizontal dial to the FLOOR LEVEL DIAL (2) on each aimer (press floor level dial inward to set reading).

6
Remove calibration fixtures from the aimers.

Adapter Assembly

1

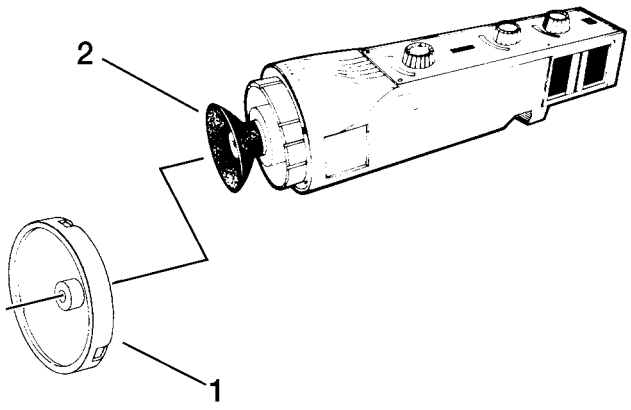


W3002345

1 Articulating Vacuum Cup Assembly
2 O-Rings
3 Extension Studs
4 Vacuum Extension Plate
5 Large Universal Adapter
6 Fixed Vacuum Cup
7 B4A Aimer

Locate the correct parts needed to assemble the aimer for use on VN headlamps. For aiming headlamps on a VN series truck, always use the large, adjustable, black adapters supplied with the Headlamp Aiming Kit. The adapters will be attached last.

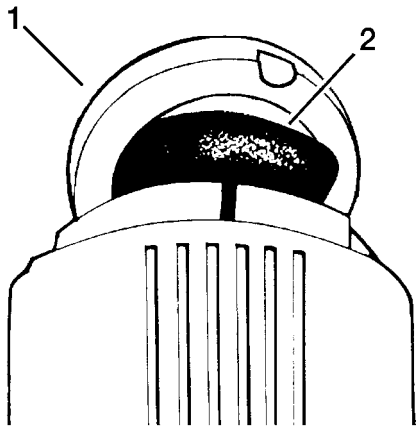
2



W3002347

Attach the vacuum extension plate assembly (1) to the fixed vacuum cup (2) on the B4A aimer. The fixed cup should be fully extended.

3

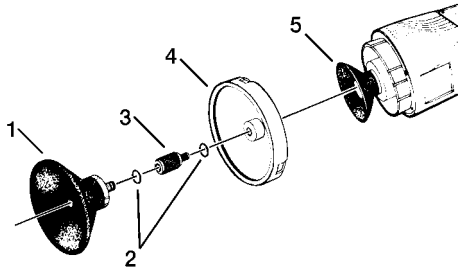


W3002395

1 Vacuum Extension Plate
2 Fixed Vacuum Cup

Squeegee the fixed cup into the round hole in the back of the vacuum extension plate.

4



W3002351

1 Articulating Vacuum Cup
2 O-Rings
3 Extension Stud
4 Vacuum Cup Extension Plate
5 Fixed Vacuum Cup

Attach an extension stud (3) to the vacuum cup assembly. The threaded stud fastens between the vacuum cup extension plate (4) and the articulating vacuum cup assembly (1). The stud must be seated firmly against the O-ring (2) in the vacuum cup extension plate.

Note: The B4A aimer kit includes 2 extension studs that can be placed between the vacuum cup extension plate and the articulating cup assembly. When using the aimer on headlamps, of the VN Series trucks, only one extension is needed.

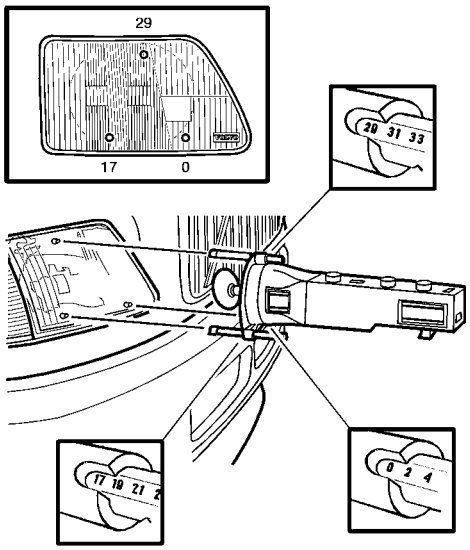
5

Install the articulating vacuum cup assembly onto the extension stud, making sure the O-ring is seated firmly against the vacuum cup.

6

Attach the large, black adapter to the B4A assembly.

Attaching the Aimer



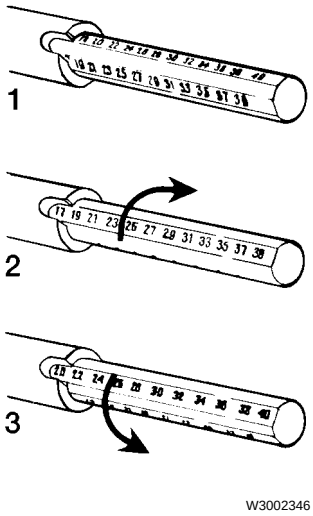
Attaching the B4A aimer

Note: For aiming headlamps on a VN series truck, always use the large adjustable, black adapters supplied with the Headlamp Aiming Kit.

1

Align the large universal adapter to the aiming pads on the lens (as shown in above). Note the numbers located on the pads of the lens. Move the adjustment rod for each pad until it agrees with the number located next to the pad. This procedure should be followed for the passenger side and driver side adapters.

2



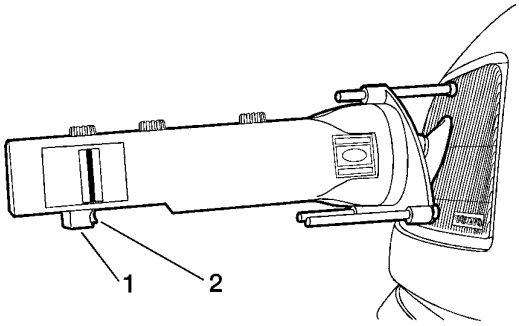
1 Neutral Position
2 Odd Number
3 Even Number

To adjust the adapter rods to the required position, turn the rods to the neutral position and slide in or out to the proper setting.

3

Turn the rod counter-clockwise to lock in an odd number and counter clockwise to lock in an even number.

4

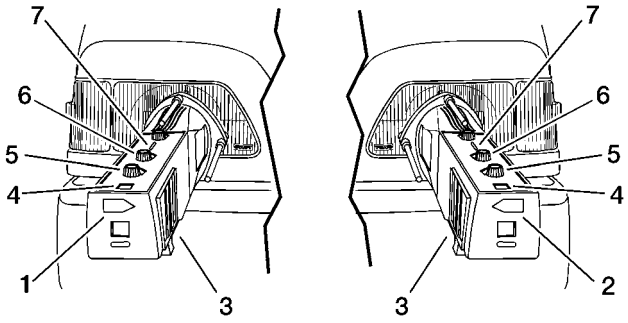


1 Piston Handle

2 Vacuum Release

Attach each aimer to the headlamps by pushing the piston handle forward, engaging the rubber suction cup. Immediately pull back the piston handle until it locks in place.

5



W3002372

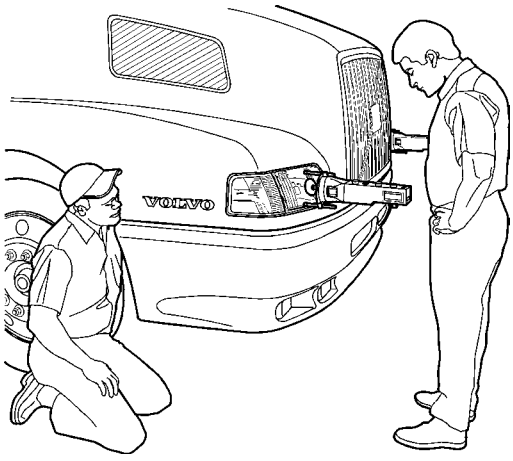
1 Unit B
2 Unit A
3 Sight Openings
4 Viewing Port
5 Horizontal Dial
6 Vertical Dial
7 Vertical Level Bubble

Unit A should be attached to the driver's side headlamp and Unit B to the passenger side. The sight openings on each aimer must face each other.

Adjusting Headlamp Aim

Horizontal Aim

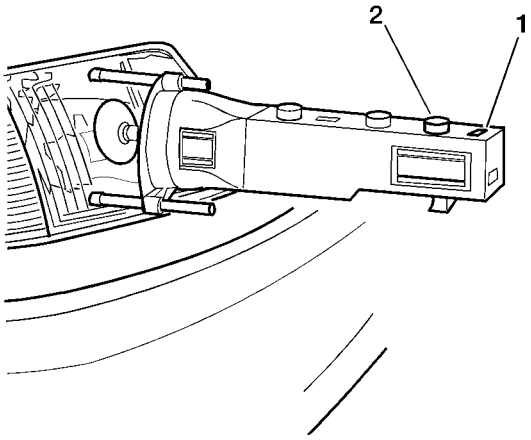
1



W3002343

Note: The horizontal and vertical headlamp screws must be adjusted from behind the headlamp, with the hood closed and secured. Adjustments to the headlamp adjusting screws must be made from under the hood. It is recommended that one person check alignment while another makes the adjustments.

2



W3002371

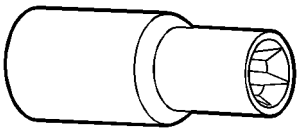
1 Viewing Port
2 Horizontal Dial

To set the horizontal aim (side to side), the horizontal dial should be set at *zero.*

3

Check to see that the split image target lines are visible in the viewing port. If necessary, rotate each aimer slightly to locate the target.

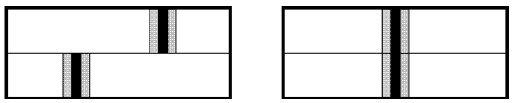
4



W3002352

Using an external torx socket, size E7, turn the horizontal adjusting screw located on the back of the headlamp.

5



W3004583

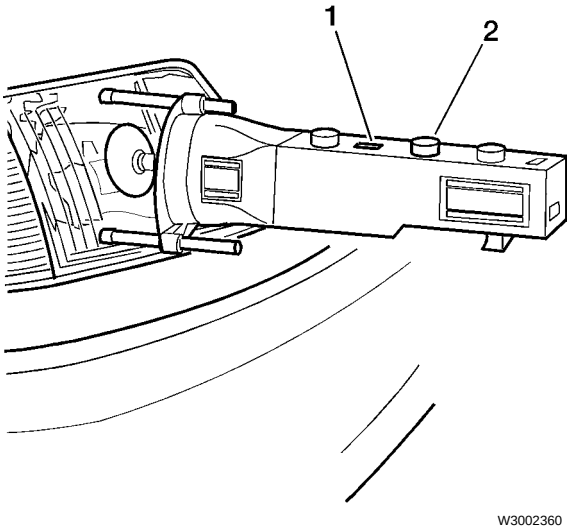
Turn the horizontal screw until split image of target line appears in mirrors as one solid line. To remove "backlash," make final adjustments by turning the screw clockwise.

6

Repeat these steps with the opposite aimer and headlamp.

Vertical Aim

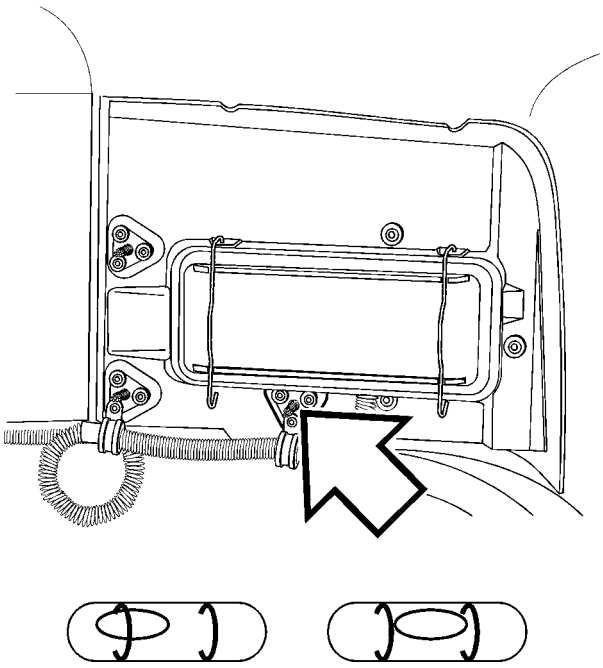
7



1 Vertical Level Bubble
2 Vertical Dial

The vertical dial should be set at *zero.*

8



Turn the vertical adjustment screw behind the headlamp until the level of the bubble is centered between the lines. To remove “backlash,” make final adjustment by turning the screw clockwise.

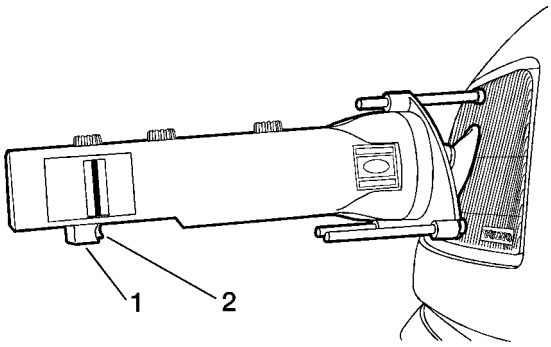
9

Repeat the last two steps with opposite aimer and headlamp.

10

Recheck target alignment on both aimers and readjust horizontal aim if necessary.

11



1 Piston Handle
2 Vacuum Release Button

Remove aimer by holding it securely and pressing the “Vacuum Release” button located on the piston handle.

3521-05-02-01 Headlamp, Adjustment

VHD

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Note: The Hoppy headlight aimer kit is recommended for aiming VN/VHD headlamps. See “Lighting System, Special Tools” page 5.

Vehicle Preparation

Before beginning the headlamp adjustment process, prepare the vehicle:

1
Drive the vehicle onto a flat surface. It isn’t necessary that this surface be exactly level.

2
Remove any large amounts of mud or ice from the underside of the fenders.

3
Check tires for noticeable deflation. Inflate if necessary.

4
See that there is no load in the vehicle other than the driver.

5
Rock the vehicle to equalize the springs. Check them for sag or broken leaves.

6
Make sure that the cab suspension and the Volvo air suspension are fully inflated and that the air system pressure is 90 psi or higher.

7

CAUTION

Some solvents and cleaners will attack and/or weaken the components of the BA aimer. Thoroughly dry any object which has been cleaned with a solvent before attaching an aimer to it.

Clean the headlamp lenses and aiming pads.

8
Check for bulb burnout, broken aimimg pads and proper beam switching.

9
Check that the hood is closed completely and is latched on both sides.

Floor Slope Calibration

Note: The headlamp aimers will not work correctly unless floor slope is taken into account. Calibration of floor slope should be done prior to aiming. However, if you regularly use one area to aim headlamps, rechecking floor slope is unnecessary. Permanently mark the area, calibrate the slope for that area and mark the setting for future reference.

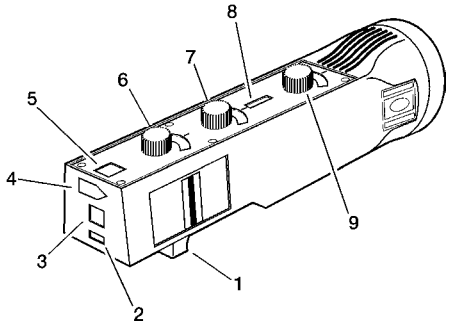
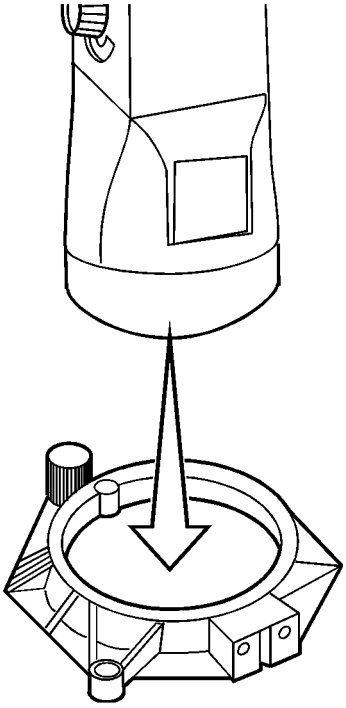


Fig. 3: B4A Aimer Unit

1 Piston Handle
2 Level Vial Bubble
3 Top Port Hole
4 Unit Identification
5 Horizontal Aim Port Hole
6 Horizontal Aim Dial
7 Vertical Aim Dial
8 Vertical Aim Vial Bubble
9 Floor Level Dial

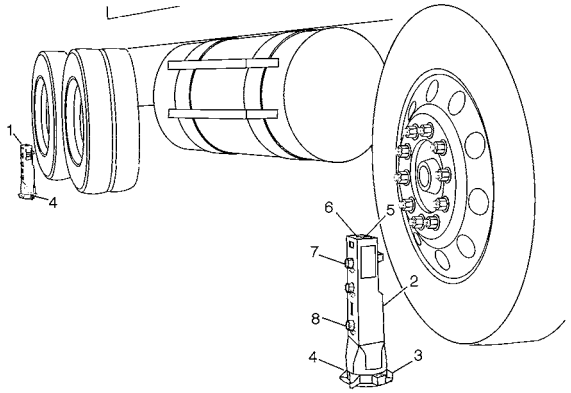
1



W3004582

Attach Calibration Fixtures to aimers. The fixtures will easily snap into place when properly positioned.

2



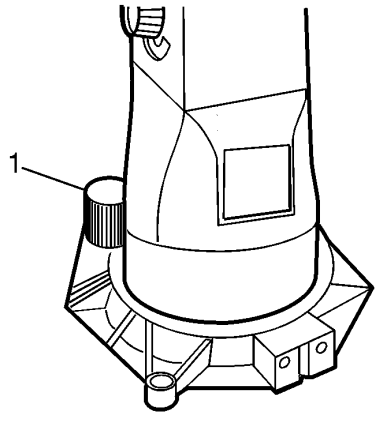
W3004584

Fig. 4: Floor Calibration (on passenger side only)

1 Unit A (rear tire)
2 Unit B (front tire)
3 Calibration Fixture
4 Thumb Adjusting Screws
5 Level Vial Bubble
6 Top Port Hole
7 Horizontal Dial
8 Floor Level Dial

Place aimers at the center line of each wheel on the passenger side of the vehicle. *Unit B must be placed at the front wheel on the passenger side with the target facing to the rear. Unit A must be placed at the rear wheel on the passenger side with the target facing front.*

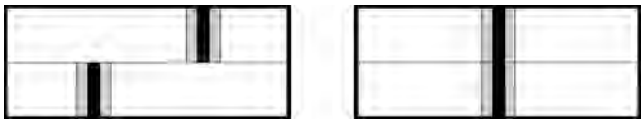
3



W3004536

Level each unit by turning the thumb adjusting screw (1) on each calibration fixture. Turn the screw either clockwise or counter-clockwise until the level vial bubble registers in a centered, level position.

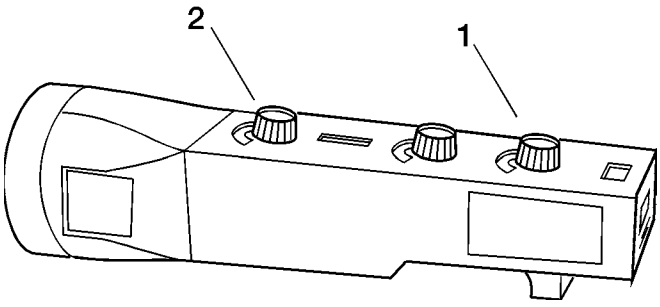
4



W3002344

Look into the top port hole of Unit A. Turn the horizontal knob until the split image is aligned.

5



W3002359

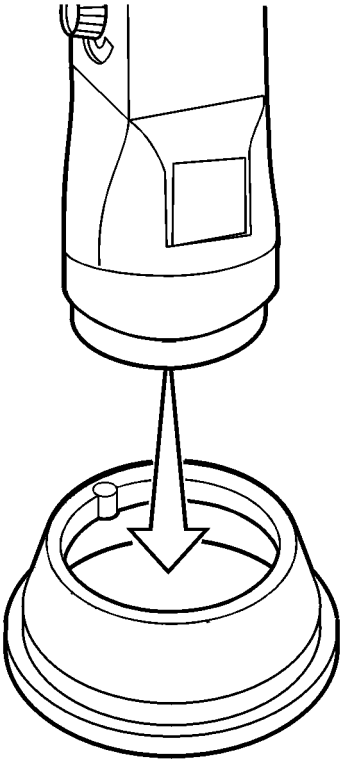
1 Horizontal Dial
2 Floor Level Dial

Transfer the plus or minus reading indicated on the horizontal dial to the FLOOR LEVEL DIAL (2) on each aimer (press floor level dial inward to set reading).

6
Remove calibration fixtures from the aimers.

Adapter Assembly

1

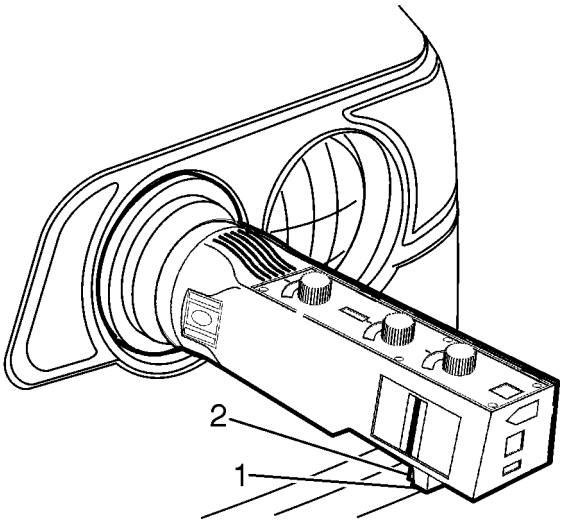


W3004355

Attach the 5–inch circular adapter to the B4A aimer.

Attaching the Aimer

1

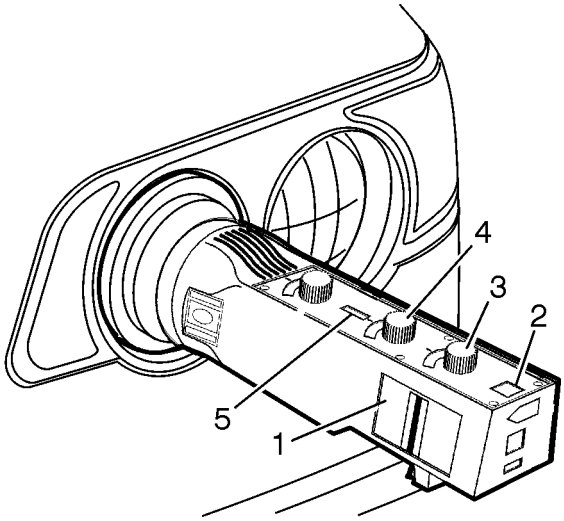


W3004541

1 Piston Handle
2 Vacuum Release Button

Align the steel inserts molded to the 5–inch circular adapter with the aiming pads on the sealed beam bulb. Attach the aimer to the headlight bulb by pushing the piston handle forward, engaging the rubber suction cup. Immediately pull back the piston handle until it locks in place. The aimer should now be held securely to the bulb by the suction cup.

2



W3004358

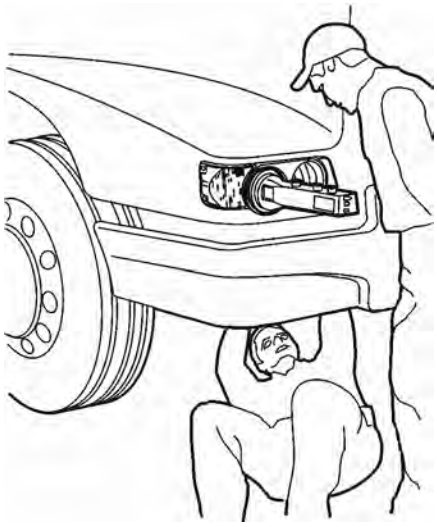
1 Unit B
2 Unit A
3 Sight Openings
4 Viewing Port
5 Horizontal Dial
6 Vertical Dial
7 Vertical Level Bubble

Unit A should be attached to the driver's side headlamp and Unit B to the passenger side. The sight opening on each aimer must face each other.

3

Since the VHD uses a four headlamp set, the headlamps must be aimed in pairs. Aim the outside headlamps as a pair. Aim the inside headlamps as a pair.

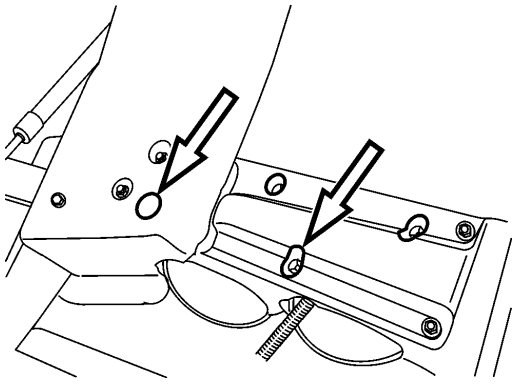
Adjusting Headlamp Aim



W3004503

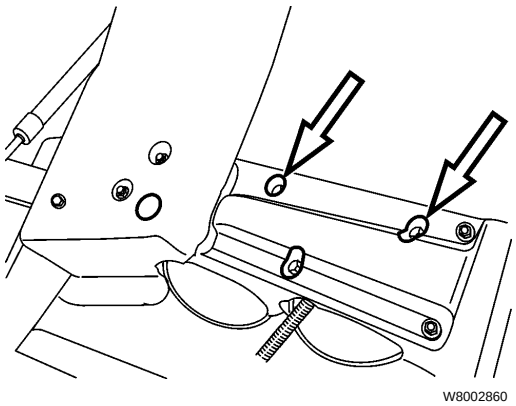
Note: For the VHD vehicles, the horizontal and vertical headlamp screws must be adjusted from behind the headlamp. Adjustments must be made with the hood closed and secured. Adjustments to the headlamp adjusting screws must be made from under the hood. It is recommended that one person check alignment while another makes adjustments to the headlamp adjusting screws.

Depending on the date of manufacture, the headlamps may be adjusted two different ways. Later model VHD vehicles are adjusted by Torx studs protruding through the rear of the headlamp assembly and hood using an external Torx E6 socket. Early model VHD vehicles are adjusted by hex head screws accessed through holes in the rear of the hood.



W8002859

Vertical Aim, Early VHD Model Shown



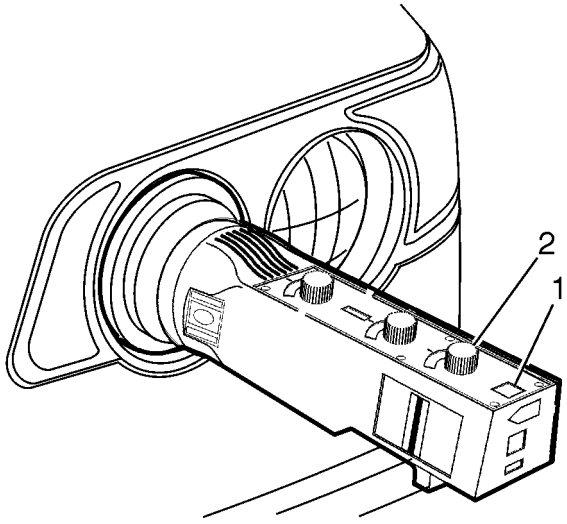
W8002860

Horizontal Aim, Early VHD Model Shown

Horizontal Aim

1
Attach the aimers to the outside headlights.

2



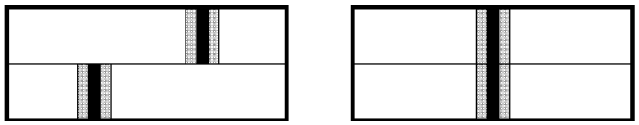
W3004354

1 Viewing Point
2 Horizontal Dial

To set the horizontal aim (side to side), the horizontal dial should be set at *zero.*

3
Check to see that the split image target lines are visible in the viewing port. If necessary, rotate each aimer slightly to locate the target.

4



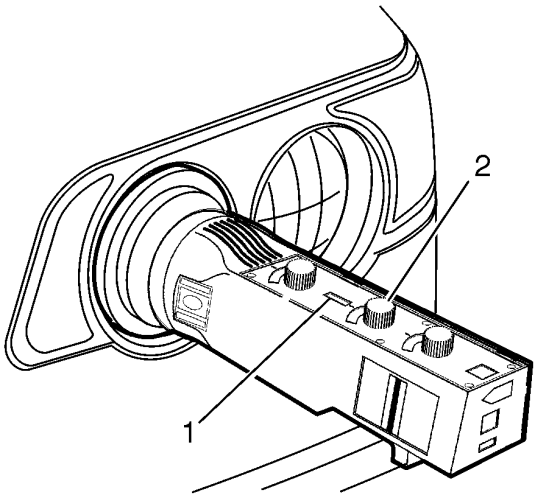
W3004583

Turn the horizontal adjusting screw until the split image of the target line appears in mirrors as one solid line. To remove “backlash,” make the final adjustment by turning the screw clockwise.

5
Repeat these steps with the opposite aimer and headlamp.

Vertical Aim

6

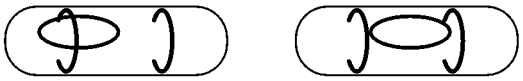


W3004542

1 Vertical Level Bubble
2 Vertical Dial

The vertical dial should be set at *zero.*

7



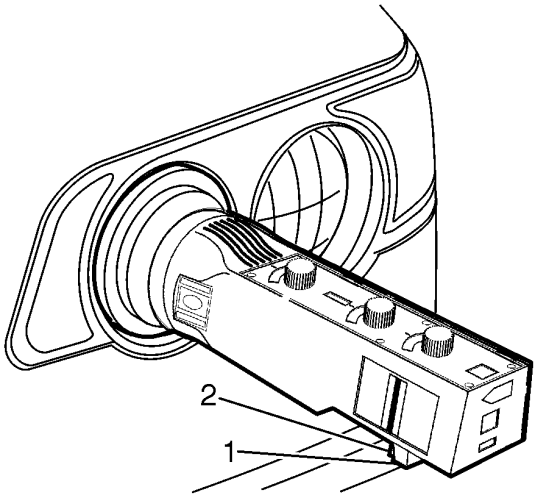
W3004544

Turn the vertical adjustment screw behind the headlamp until the level of the bubble is centered between the lines. To remove “backlash,” make final adjustment by turning the screw clockwise.

8
Repeat the last two steps with opposite aimer and headlamp.

9
Recheck target alignment on both aimers and readjust horizontal aim if necessary.

10



W3004541

1 Piston Handle
2 Vacuum Release Button

Remove aimers by holding it securely and pressing the “Vacuum Release” button located on the piston handle.

11
Attach aimers to outside headlights and repeat adjustment procedures.

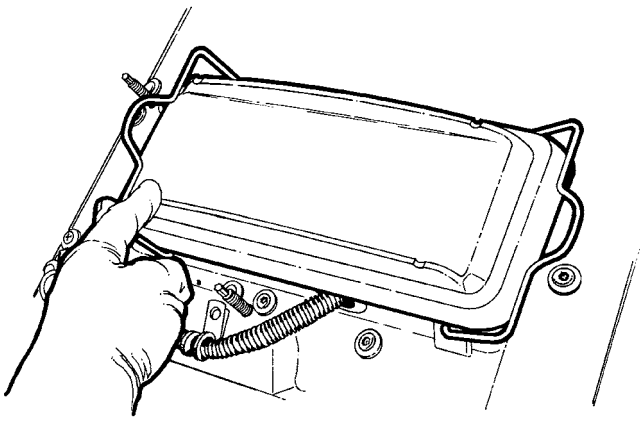
3514-03-02-06 Bulb, Replacement (Front Turn/Park Lamp)

VN

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

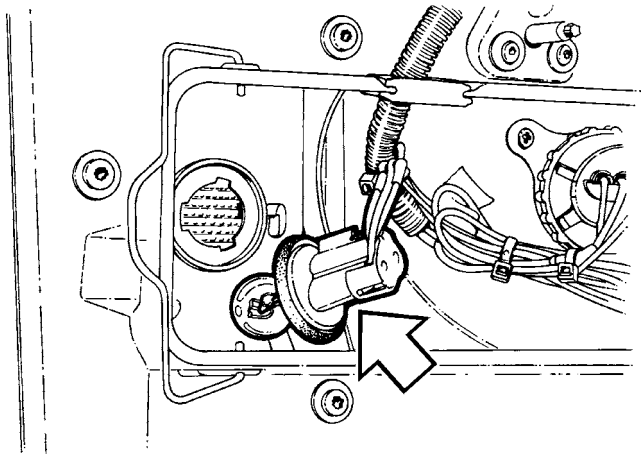
1



W8001104

Remove the dustcover from the rear of the headlight assembly.

2



W8001125

To remove the bulb socket, depress the locking tab and twist the socket counter-clockwise.

3
Replace the bulb.

4
Position the socket assembly and twist into position. Make sure that the locking tab is engaged.

5
Install the dust cover.

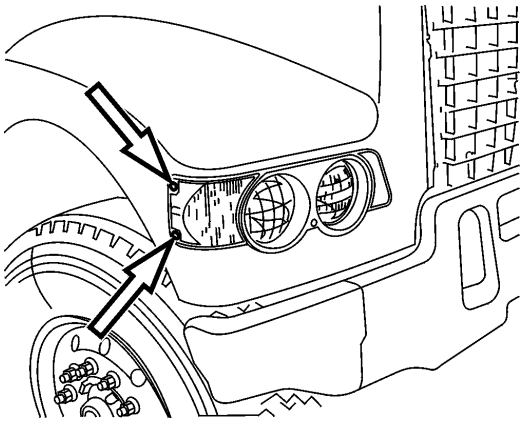
3514-03-02-06 Bulb, Replacement (Front Turn/Park Lamp)

VHD

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

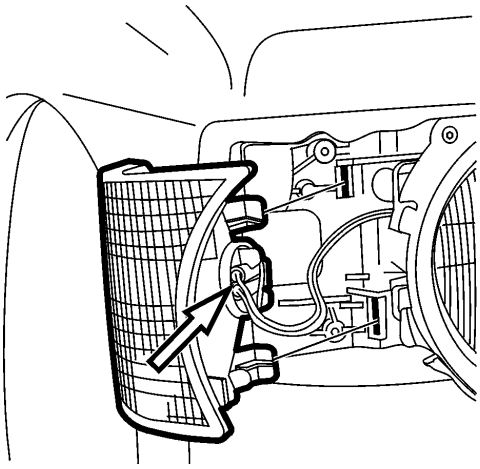
1



W8002698

Remove the two mounting screws that mount the turn signal assembly.

2



W3004379

Pull the turn signal assembly straight out to the side. To remove the bulb socket, twist the socket counter-clockwise.

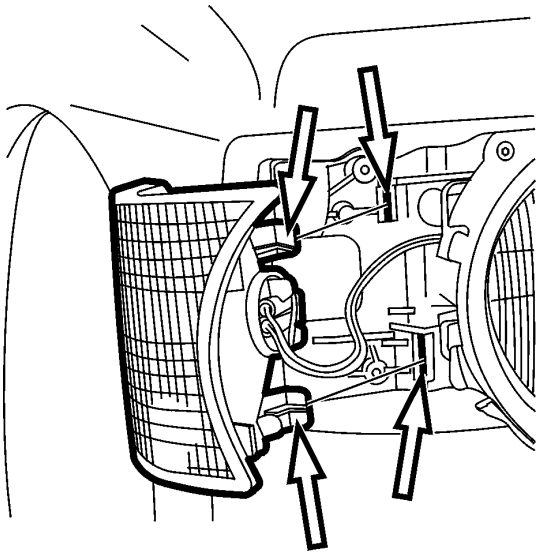
3

Replace the bulb.

4

Position the socket assembly and twist into position.

5



W8002700

Slide the turn signal assembly from side to side, into the housing tabs.

6

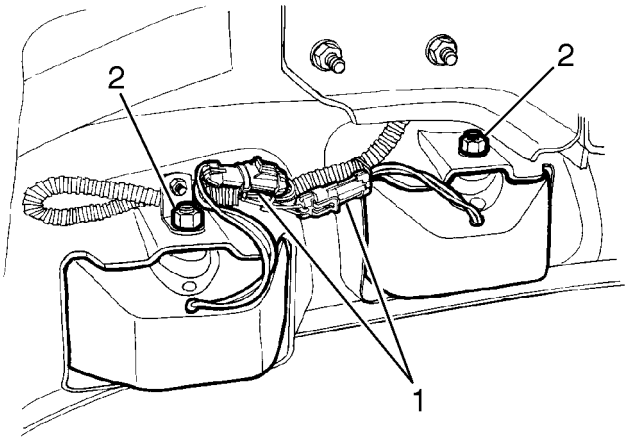
Tighten the two mounting screws.

3514-03-02-09 Bulb, Replacement (Fog/Driving Lamp)

VN

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.



W3004455

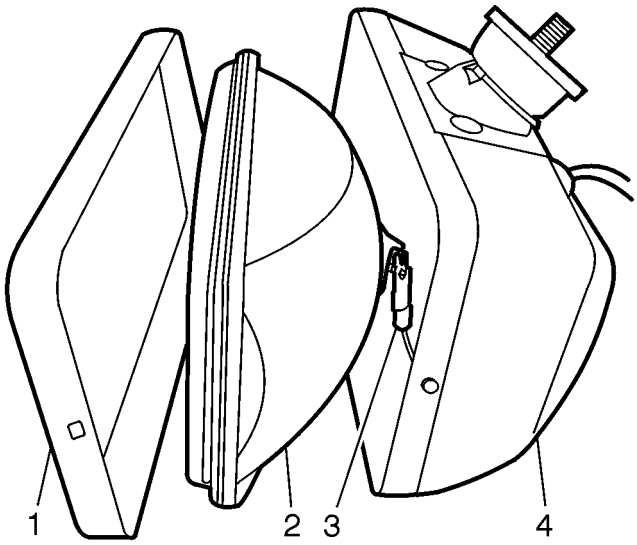
1 Connector

2 Mounting Nut

1
Disconnect the connector (1) to the defective lamp. Cut away any cable ties as necessary.

2
Remove the mounting nut (2) and remove the lamp from the bumper.

3



W3004418

1 Bezel
2 Bulb
3 Connectors
4 Housing

Remove the bezel screws and remove the bezel (1).

4
Remove the bulb wiring connectors (3), replace the bulb (2) and reconnect.

5
Install the bezel and secure.

6
Position the lamp assembly in the bumper to point straight ahead. Secure with the mounting nut. Torque to 12 ± 5 Nm (9 ± 4 ft-lb).

12 ± 5 Nm (9 ± 4 ft-lb)

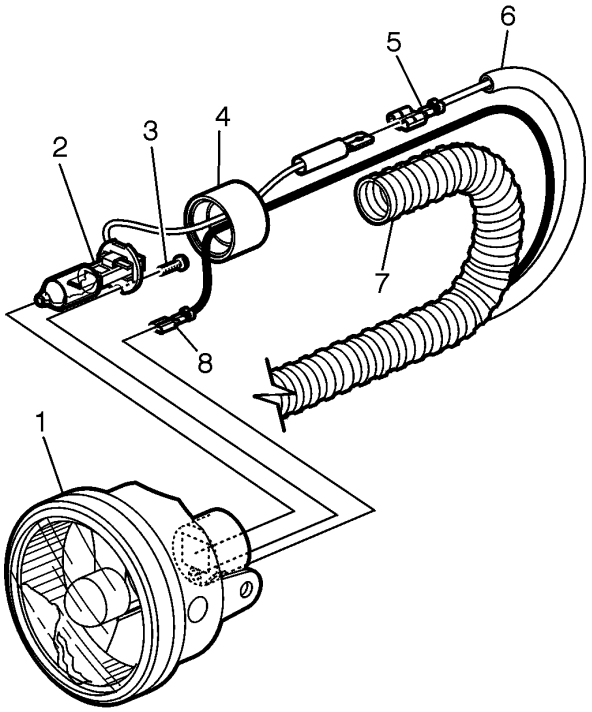
7
Connect the wiring connector. Secure with cable ties as necessary.

3514-03-02-09 Bulb, Replacement (Fog/Driving Lamp)

VHD

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.



W3004569

1
Disconnect the connector to the defective lamp. Cut away any cable ties as necessary.

2
Remove the mounting nut and remove the lamp from the bumper.

3
Pull back the harness conduit (7) and disconnect the positive wire connector (5). It may be necessary to remove protective heat shrink tubing (6) to access the connector.

4
Pull the rear lamp seal (4) away from the housing (1).

5
Disconnect the ground wire connector (8) in the recessed bulb socket.

6
Remove the screw (3) holding the bulb assembly (2) and remove.

7
Install the replacement bulb assembly into the housing and secure with the screw.

8
Connect the ground wire to the terminal.

9
Install the rear seal onto the housing.

10
Position a new piece of heat shrink tubing onto the positive wire. Connect the connector and seal with the heat shrink tubing.

11
Work the wiring back into the conduit.

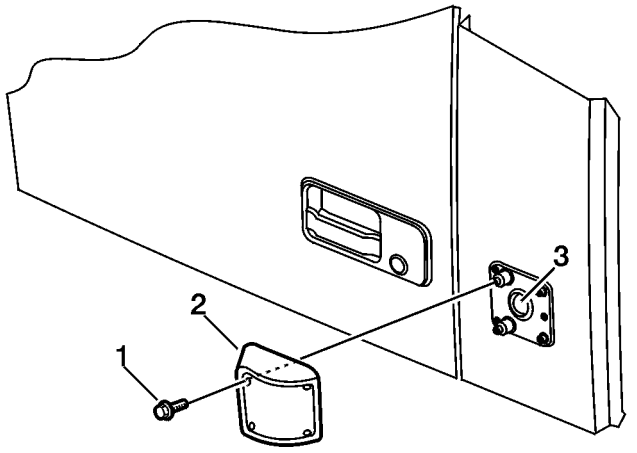
12
Position the lamp assembly in the bumper to point straight ahead. Secure with the mounting nut.

13
Connect the wiring connector. Secure with cable ties as necessary.

3514-03-02-03 Bulb, Replacement (Side Marker Lamp)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.



W3004380

1 Screw with seal
2 Lens
3 Bulb

1
Remove the lens screws and seals (1).

2
Remove the lens (2).

3
Replace the bulb (3).

4
Install the lens and secure with the screws and seals.

3514-03-02-04 Bulb, Replacement (Cab Marker Lamp)

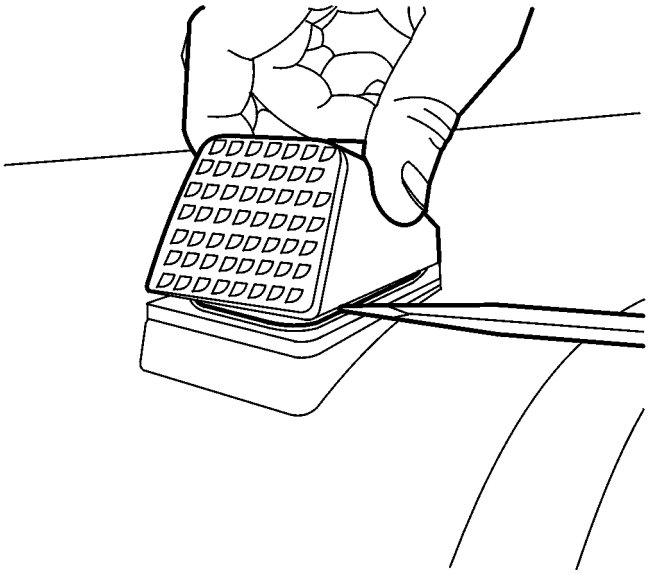
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Cab marker lamps may be replaceable incandescent bulbs or sealed LED lamps.

Incandescent Bulbs

1



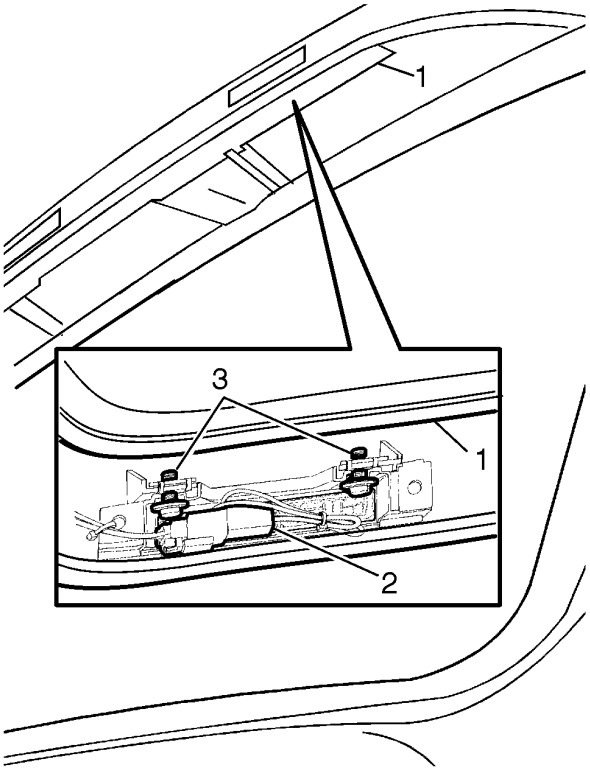
W3004377

Use a screwdriver to remove the lens.

2
Replace the bulb.

3
Snap lens onto the mounting base.

LED Lamps



W3004372

1
Remove the rear lamp cover (1) from the exterior sun visor as needed to access the defective lamp.

2
Disconnect the connector (2).

3
Remove the mounting screws (3) and the LED lamp assembly.

4
Position the replacement LED lamp assembly in its mounting location and secure with the mounting screws.

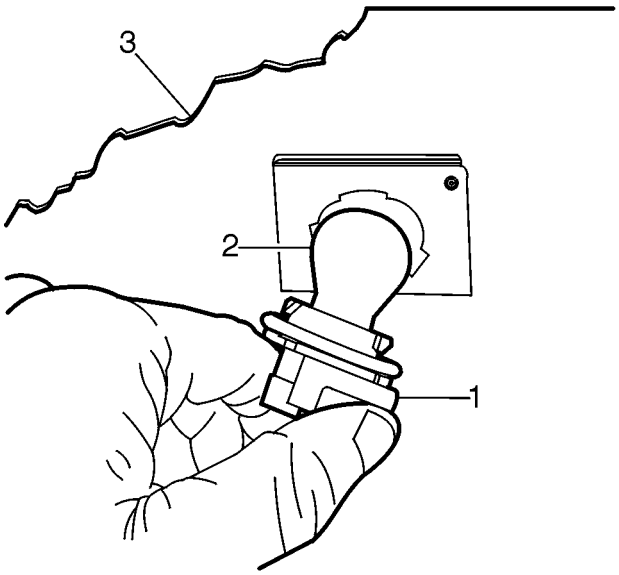
5
Connect the connector.

6
Secure the rear lamp cover to the exterior sun visor.

3514-03-02-10
Bulb, Replacement (Sign Light)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.



W3004422

1 Socket
2 Bulb
3 Roof Air Fairing

1
Remove the bulb socket (1) by twisting the socket counter-clockwise.

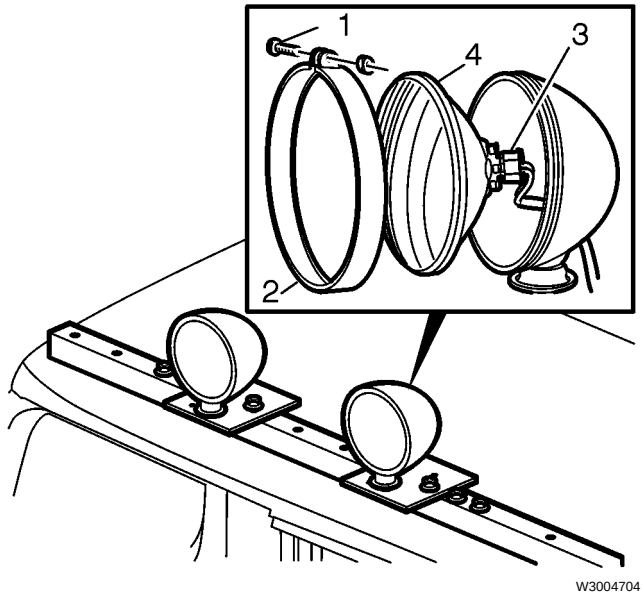
2
Replace the bulb (2).

3
Position the socket assembly and twist into position.

3514-03-02-17
Bulb, Replacement (Snow Plow Lamp)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.



W3004704

1
Remove the trim ring screw (1) and remove the trim ring (2).

2
Disconnect the connector (3) and remove the bulb (4).

3
Engage the connector and position the replacement bulb in the housing.

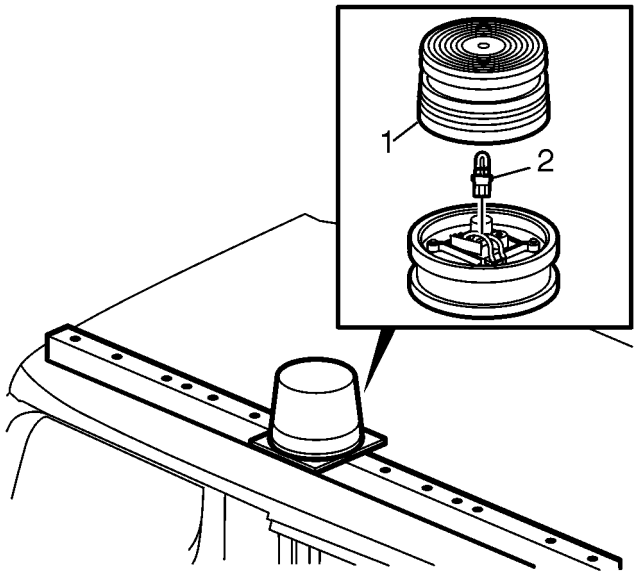
4
Position the trim ring to secure the bulb into the housing and install the trim ring screw.

3514-03-02-18
Bulb, Replacement (Beacon Lamp)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

1



W3004705

Work the lens (1) out of the rubber grommet.

2
Use a small slotted screwdriver to remove the bulb (2) from its socket.

3
Plug the replacement bulb into the socket.

4
Install the lens into the rubber grommet.

3514-03-02-02 Bulb, Replacement (Rear Lamp)

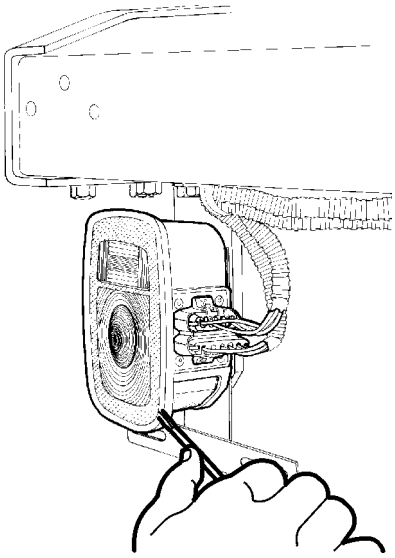
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Note: The rear lamps include tail, turn, stop, and back up (reverse). Rear lamp design may differ slightly but generally will be either the replaceable bulb type or sealed unit.

Bulb Type Lamp

1

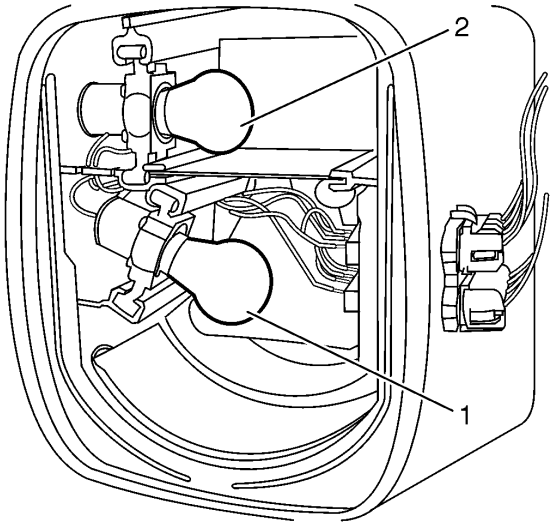


W3004374

Remove rear lamp lens.

Note: Some designs will require removal of lens mounting screws.

2



W3004375

1 Turn, Stop, Tail Bulb
2 Back up Bulb

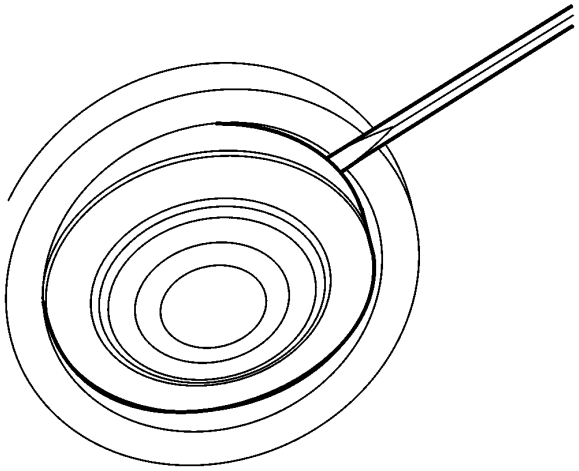
Replace the defective bulb.

3

Install the lens.

Sealed Lamp

1



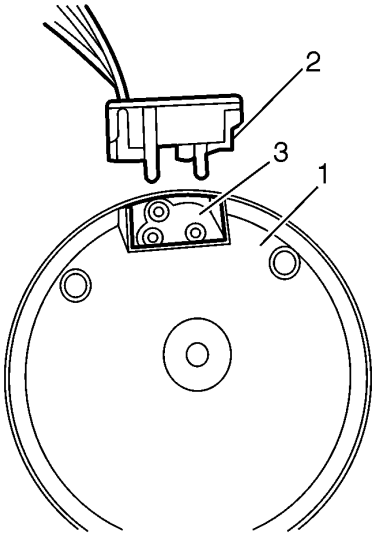
W3004370

Remove the defective lamp from the grommet mounting.

2

Disconnect the connector at the rear of the lamp.

3



W3004581

1 Sealed Lamp
2 Connector
3 Dielectric Grease Area

Note: Apply dielectric grease (3) to sealed lamps with non-weather resistant connectors before installation. Generally, new replacement lamps will have a dielectric grease factory added.

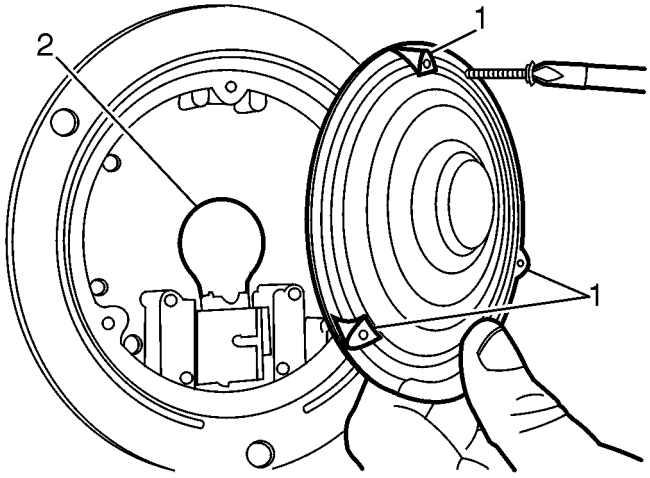
Connect the connector (2) to the replacement lamp.

4
Press the replacement lamp into the grommet mounting.

3514-03-02-11 Bulb, Replacement (Back of Cab Lamp)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.



W3004371

1
Remove the lens mounting screws (1).

2
Replace bulb (2).

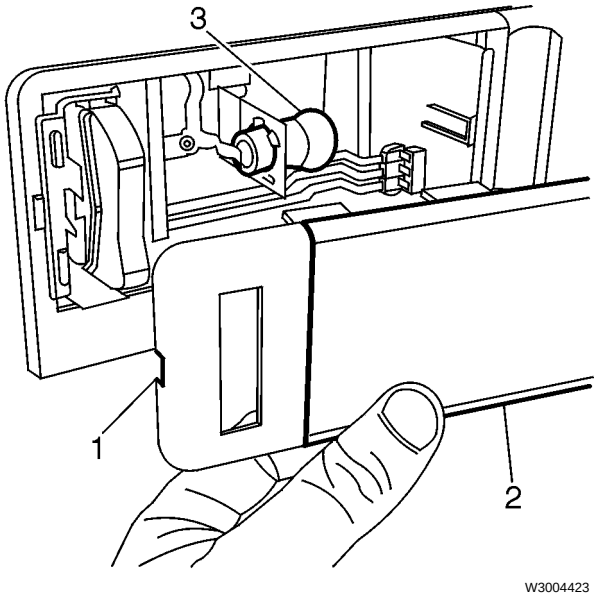
3
Install lens.

3514-03-02-12 Bulb, Replacement (Door Lamp)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

1



W3004423

1 Mounting Clip
2 Lens
3 Bulb

Release the lens mounting clip (1) at the switch end of the lens.

2
Replace the bulb.

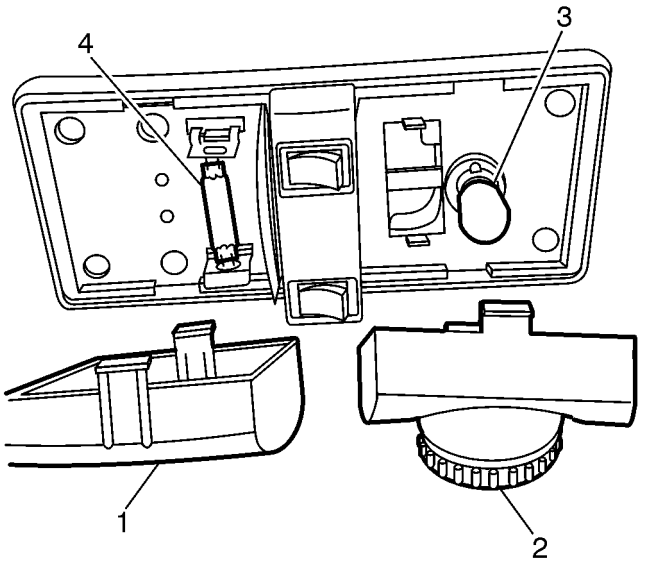
3
Snap the lens into its mounting position.

3514-03-02-01 Bulb, Replacement (Interior/Reading Lamp)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Note: The design of the interior/reading lamp assembly may differ from the one shown.



W3004539

1 Interior Lamp Lens
2 Reading Lamp Lens
3 Reading Lamp Bulb
4 Interior Lamp Bulb

1
Use hand pressure to release the lens mounting tabs.

2
Replace the bulb.

3
Snap the lens into its mounting position.

3514-03-02-14
Bulb, Replacement (Interior Fluorescent Lamp)

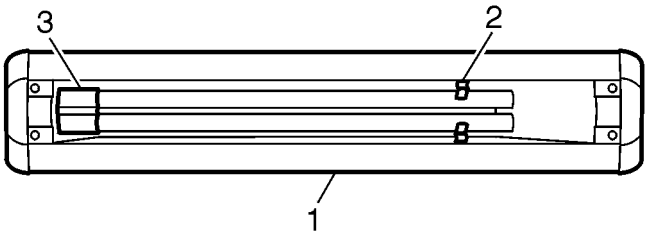
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

1

Slots running the length of the lamp hold the lens in place. Apply hand pressure to release the lens from the mounting slots.

2



W3004420

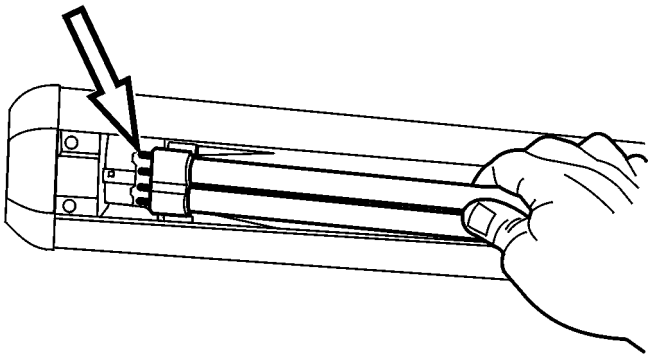
1 Lamp Assembly

2 Support Clip

3 Base

Release the end of the bulb from the support clip (2) by pulling down gently. With the end released, pull the bulb from the mounting base (3).

3



W3004421

Carefully push the replacement bulb into the mounting base socket. Secure into the support clip.

4

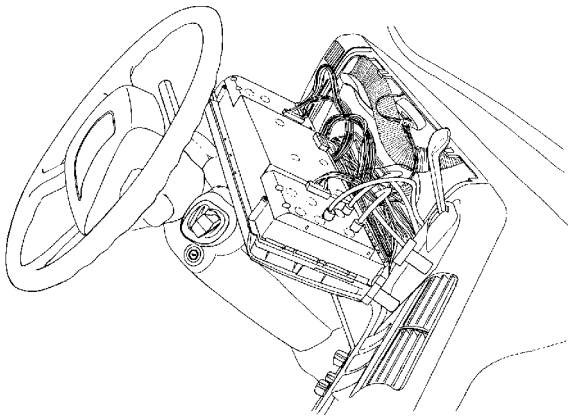
Install the lens.

3514-03-02-15 Bulb, Replacement (Climate Control Panel)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

1



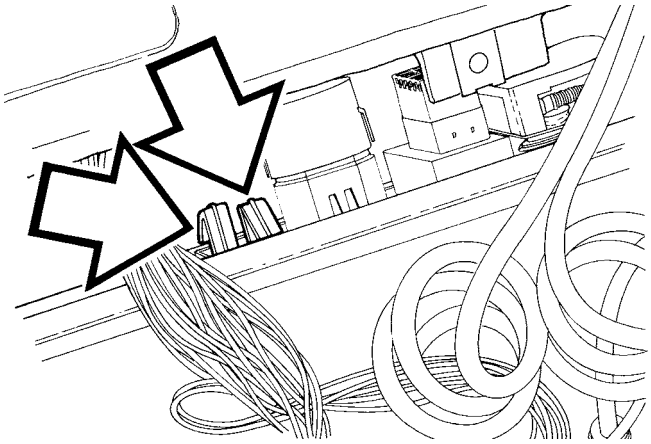
W3000641

CAUTION

Do not leave the cluster face-down for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Remove the two screws at the top of the instrument cluster and lay the cluster face-down on the steering column (if steering column is adjustable, adjust as far back as possible before leaning cluster out).

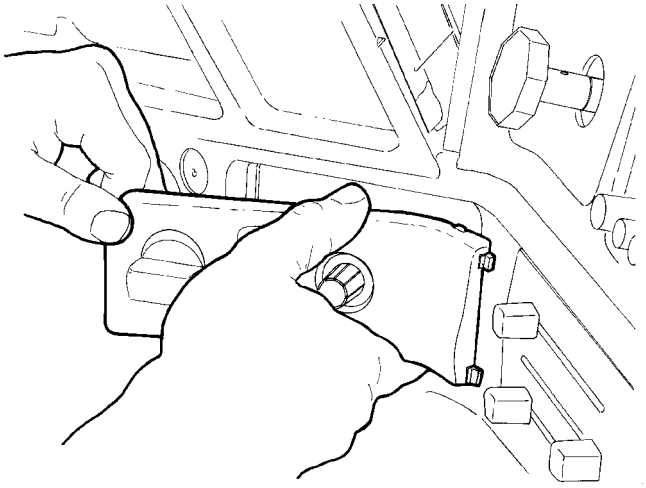
2



W3000650

To release the driving light switch panel, reach behind the panel and depress the top and bottom clips on the left side.

3



W3000996

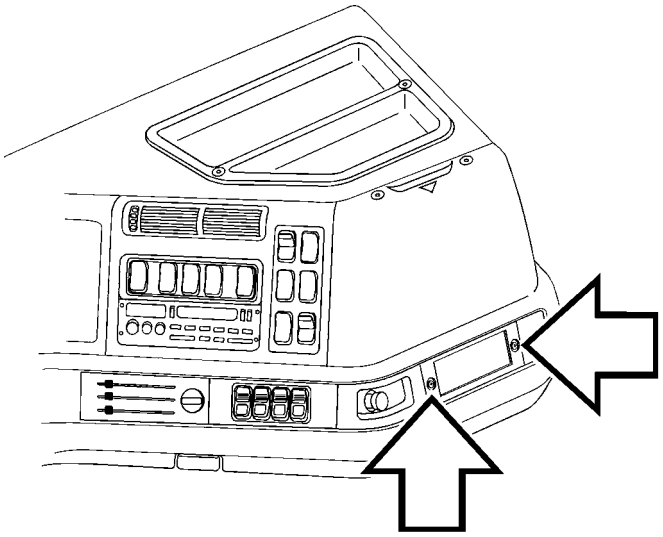
Pull the panel through the front of the dash, pulling toward the driver's side to clear tip inserts.

4

Once the panel is removed, install the instrument cluster back in its original position and tighten the two screws at the top of the cluster. Torque to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).

2 ± 0.3 Nm (17.5 ± 2.5 in-lb)

5



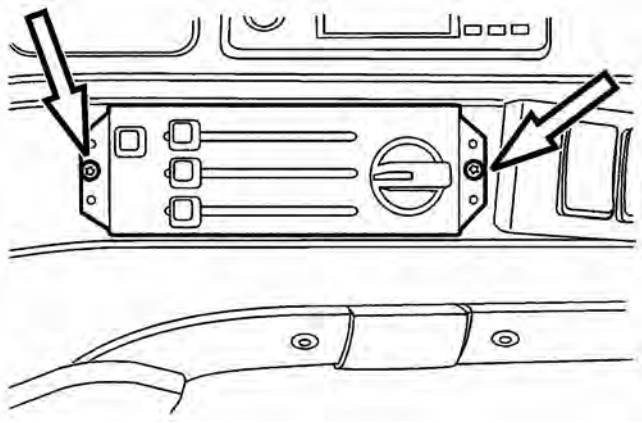
W3000649

Remove the ashtray from the ashtray housing. Remove the two screws from the ashtray housing and remove the housing.

6

Once the ashtray housing is removed, the air switch panel can be removed from the dash. Pull the air switch panel away from the dash and to the left to clear the tip inserts.

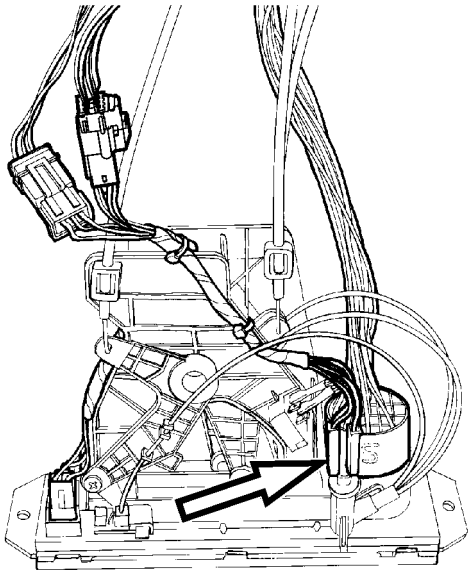
7



W3004378

Remove the screws securing the climate control panel and pull the panel out of the dash.

8



W3004381

Remove the connectors and slide the bulb assembly out of the climate control panel.

9

Install the replacement bulb assembly into the climate control panel and connect the wiring connectors.

10

Secure the climate control panel into the dash with the mounting screws.

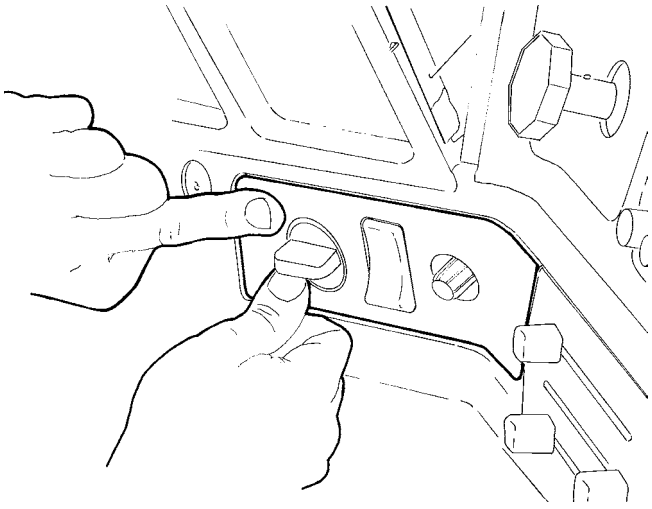
11

Align and install the air switch in the dash.

12

Install the ashtray housing with the two mounting screws, and place the ashtray in housing.

13



W3000647

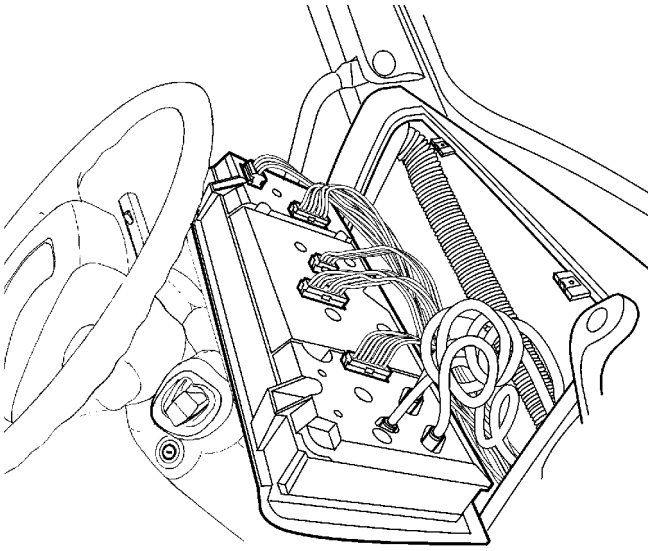
Install the driving light switch panel by inserting the tips on the right side and pushing the panel into position. The clips will snap in place on the left side.

3514-03-02-16
Bulb, Replacement (Instrument Cluster)

DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

1



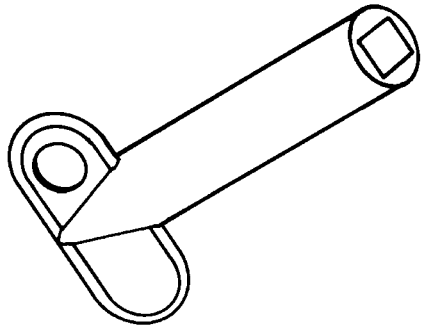
W3003659

CAUTION

When servicing or troubleshooting, do not leave the cluster face down for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Adjust the steering column back where possible. Remove the two screws at the top of the instrument cluster and lay the cluster face-down on the steering column.

2



W3000642

CAUTION

Use only the Volvo bulb removal tool, P/N 1089953, to remove bulbs, or damage to the cluster may occur.

Insert removal tool, P/N 1089953, onto the bulb assembly. Rotate 1/4 turn and pull the bulb assembly out of the socket.

3
Insert the new bulb assembly into the removal tool, P/N 1089953. Insert the assembly into the cluster socket and rotate 1/4 turn.

4
Replace the instrument cluster in the dash and tighten the two screws at the top of the cluster. Torque to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).

3648-03-02-01 Turn Signal Flasher, Replacement

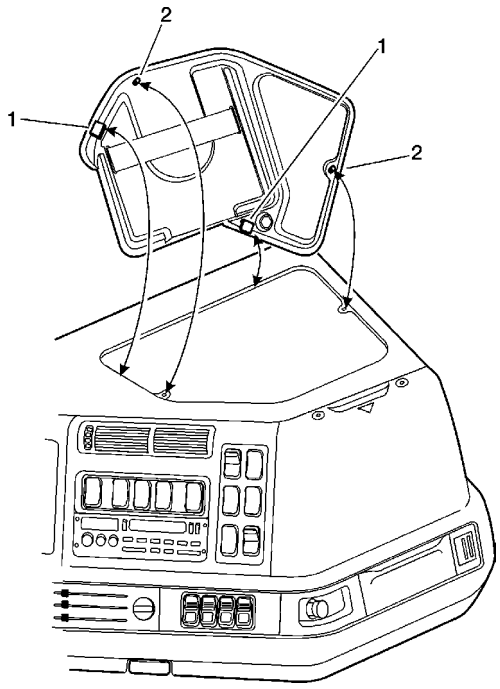
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Remove

1
Turn the ignition key to the “OFF” position.

2

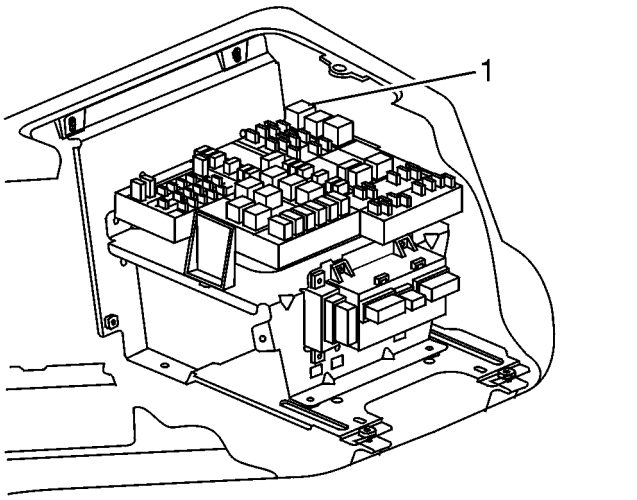


W8002059

1 Top TEC cover tabs
2 Mounting screws

To remove the top TEC cover, remove the mounting screws and lift the right side rear corner. Then, pull the cover back toward the passenger side to clear the tabs on the front and left sides.

3



W3004469

1 Turn Signal Flasher

Remove the turn signal flasher from its mounting location. Relay puller to J-43244 may be used to aid removal.

Install

1
Install the replacement turn signal flasher.

2
Install the top TEC cover and secure with the mounting screws.

3526-03-02-05 Daytime Running Light Module, Replacement

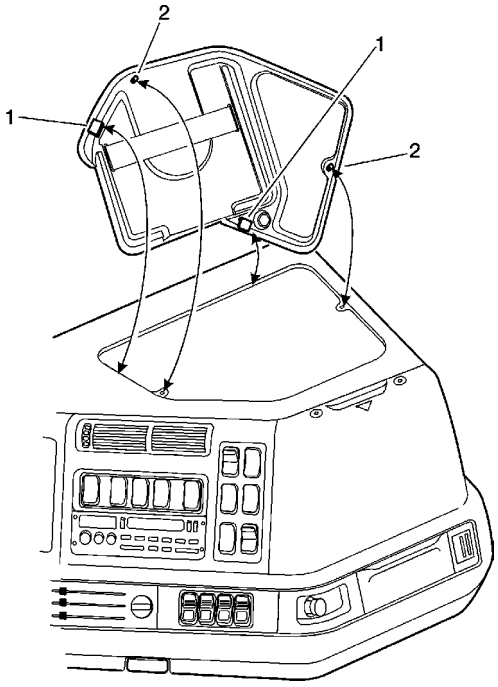
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Remove

1
Turn the ignition key to the “OFF” position.

2

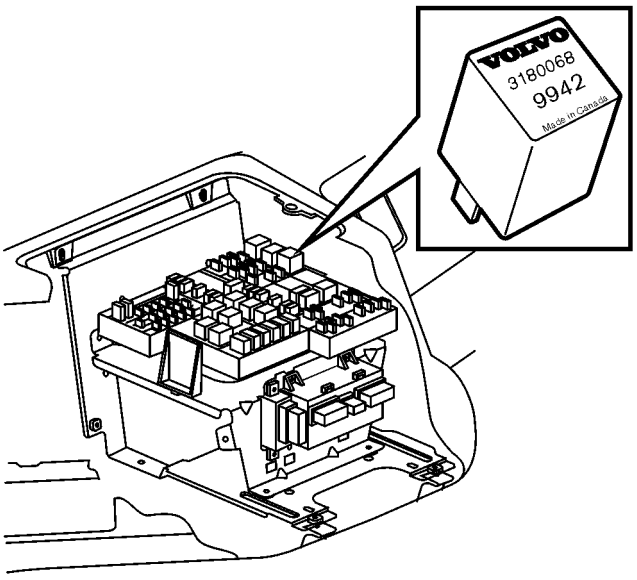


W8002059

1 Top TEC cover tabs
2 Mounting screws

To remove the top TEC cover remove the mounting screws and lift the right rear corner. Then, pull the cover back toward the passenger side to clear the tabs on the front and left sides.

3



W3004444

Remove the DRL module from its mounting location. Relay puller to J-43244 may be used to aid removal.

Install

1
Install the replacement DRL module.

2
Install the top TEC cover and secure with the mounting screws.

3643-03-02-01 Turn Signal/CC Switch Assembly, Replacement

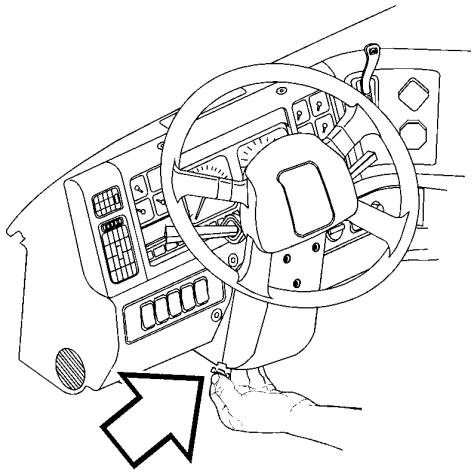
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral, and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Removal

1
Turn the ignition key ***OFF***.

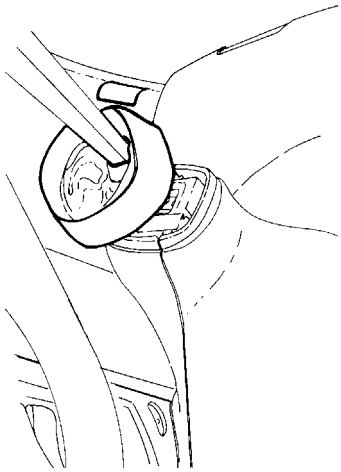
2



W8002166

Remove the 2 clips at the bottom of the steering column cover.

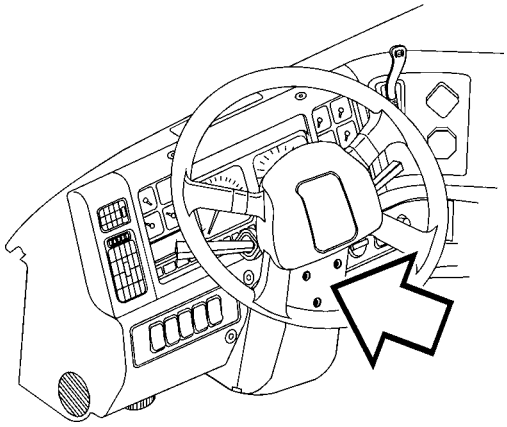
3



W3000653

Adjust the steering column up and toward you, where possible. Remove the front steering column cover by removing the 3 torx bolts from the cover and sliding the rubber grommets off of the cover.

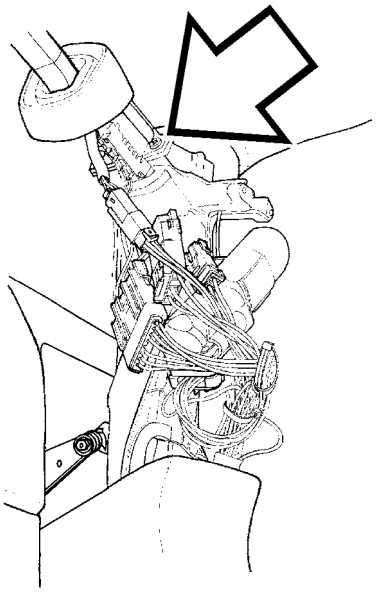
4



W8002165

Push the steering column forward and up, where possible. Remove the 3 torx bolts from the rear column cover and remove cover.

5



W3000643

Disconnect all electrical connections for turn signals, cruise, and headlamp dimmer switch. Remove the 2 torx bolts on the sides of the switch and remove switch.

Installation

1

Mount the switch assembly to steering column with the 2 bolts and connect all electrical connectors. Tighten bolts to 5 ± 0.8 Nm (44 ± 7 in-lb).

5 ± 0.8 Nm (44 ± 7 in-lb)

2

Pull steering column back and up, where possible. Install front cover by installing torx bolts. Tighten bolts to 5 ± 0.8 Nm (44 ± 7 in-lb).

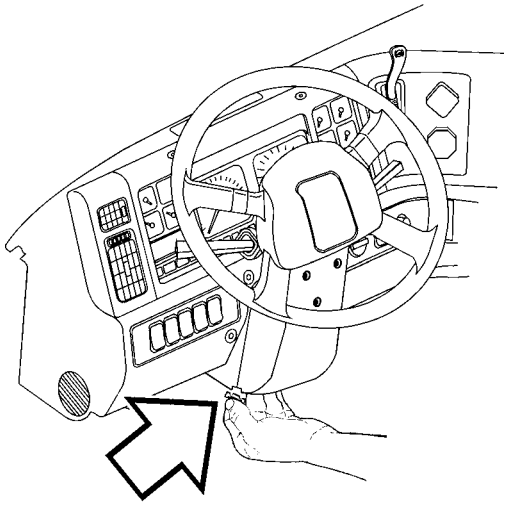
5 ± 0.8 Nm (44 ± 7 in-lb)

3

Push the steering column forward and up, where possible. Install the rear cover of the steering column by installing torx bolts and attaching rubber grommets at the stalk switches. Tighten bolts to 5 ± 0.8 Nm (44 ± 7 in-lb).

5 ± 0.8 Nm (44 ± 7 in-lb)

4



W8002166

Install the 2 clips on the bottom of the steering column cover.

3646-03-02-06 Headlamp/Parking Lamp Switch, Replacement

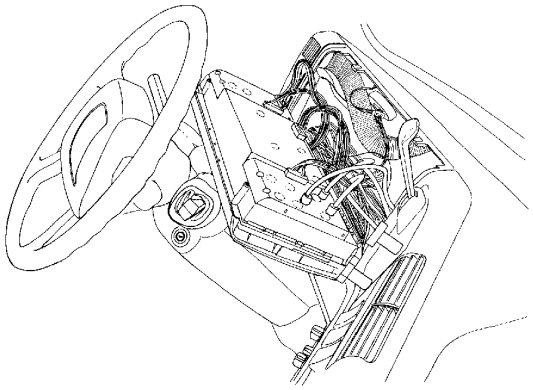
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral, and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Removal

1
Turn the ignition key ***OFF***.

2



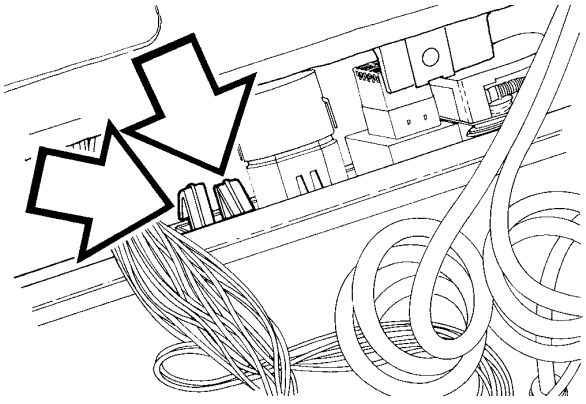
W3000641

CAUTION

Do not leave the cluster face-down for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Remove the two screws at the top of the instrument cluster and lay the cluster face-down on the steering column (if steering column is adjustable, adjust as far back as possible before leaning the cluster out).

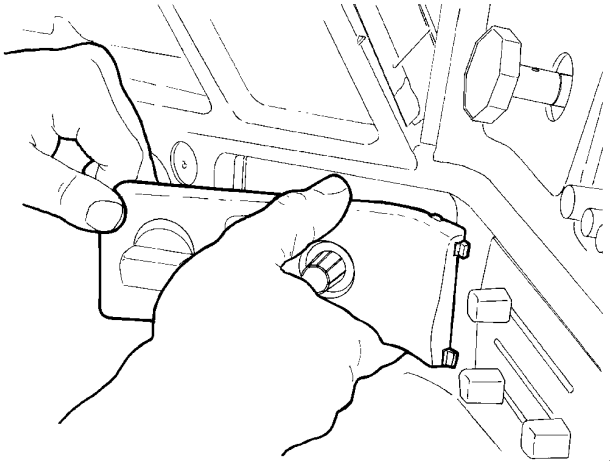
3



W3000650

To release the switch panel, reach behind the panel and depress the top and bottom clips on the left side.

4



W3000996

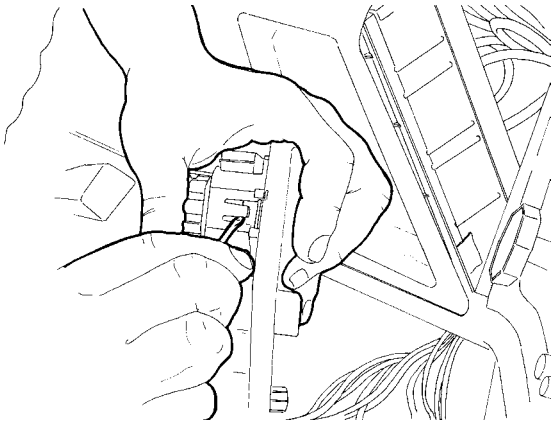
Pull the panel through the front of the dash, pulling toward the driver's side to clear tip inserts.

5

Once the switch panel is removed, install the instrument cluster in the dash and tighten the 2 screws at the top of the cluster. Tighten to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).

2 ± 0.3 Nm (17.5 ± 2.5 in-lb)

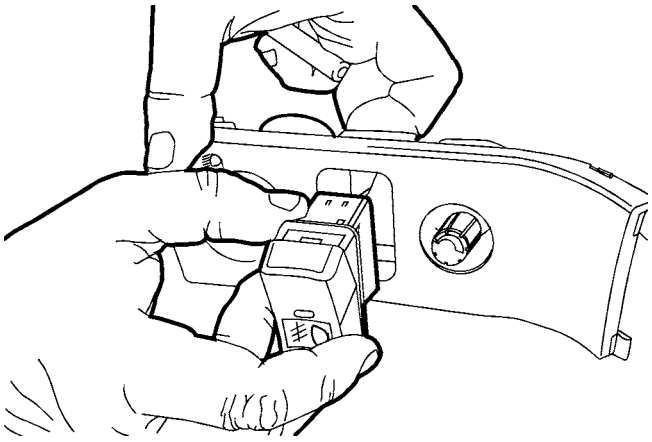
6



W3000646

Disconnect connector. Remove switch from panel by pulling locking tabs away from switch with a No. 1 screwdriver.

7

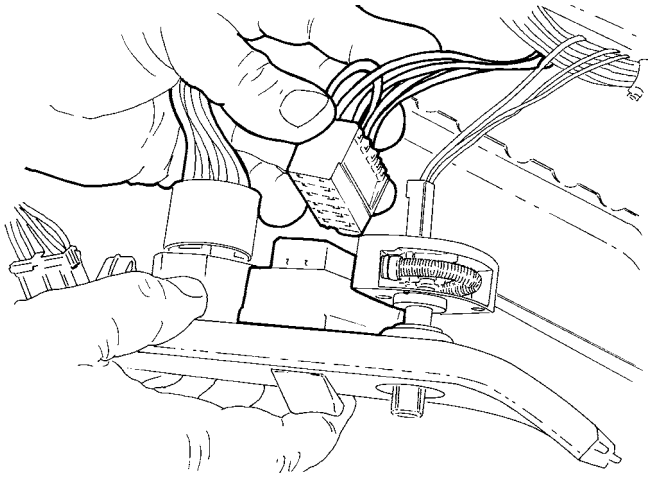


W3000682

Remove the switch through the front of the panel.

Installation

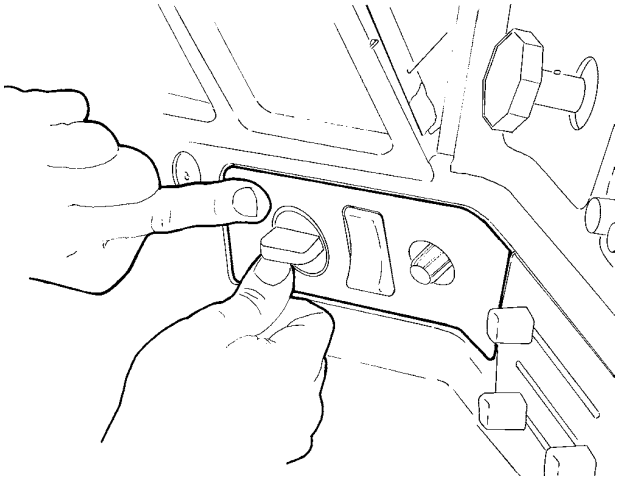
1



W3000680

Install the new switch into the panel. Push the switch into the panel until it locks. Push back on the switch to make certain it is locked in the panel. Connect the electrical connector.

2



W3000647

Install the panel by inserting tips on right side and pushing the panel into position. The clips will snap in place on the left side.

Fog/Driving Lamp Switch, Replacement

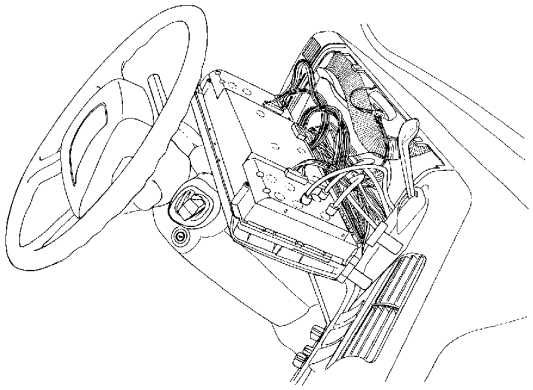
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral, and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Removal

1
Turn the ignition key ***OFF***.

2



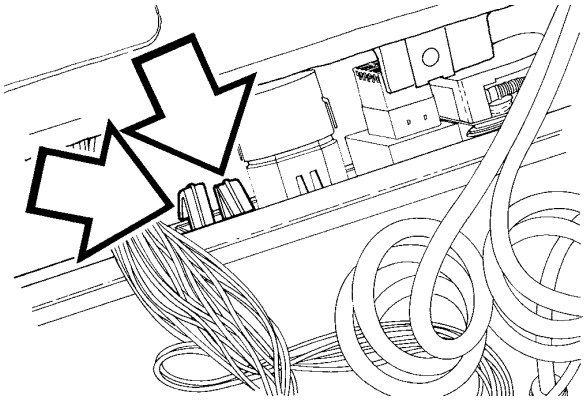
W3000641

CAUTION

Do not leave the cluster face-down for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Remove the two screws at the top of the instrument cluster and lay the cluster face-down on the steering column (if steering column is adjustable, adjust as far back as possible before leaning the cluster out).

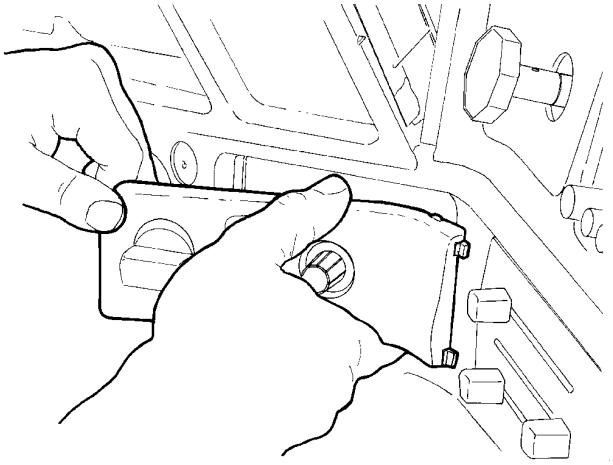
3



W3000650

To release the switch panel, reach behind the panel and depress the top and bottom clips on the left side.

4



W3000996

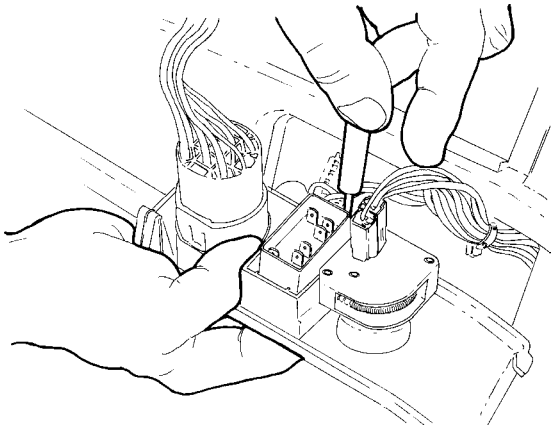
Pull the panel through the front of the dash, pulling toward the driver's side to clear tip inserts.

5

Once the switch panel is removed, install the instrument cluster in the dash and tighten the 2 screws at the top of the cluster. Tighten to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).

2 ± 0.3 Nm (17.5 ± 2.5 in-lb)

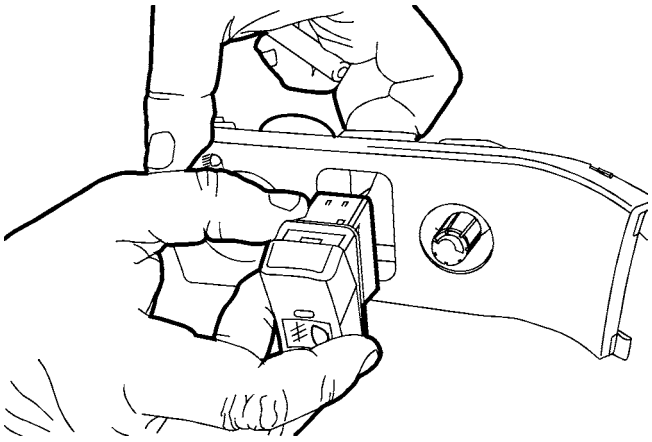
6



W3000679

Disconnect connector. Remove switch from panel by inserting a No. 1 screwdriver into the back of the switch at the top and bottom to release the locking tabs.

7

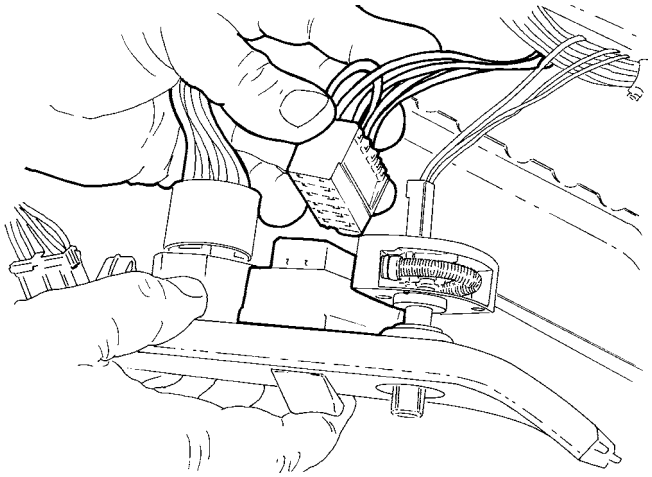


W3000682

Remove the switch through the front of the panel.

Installation

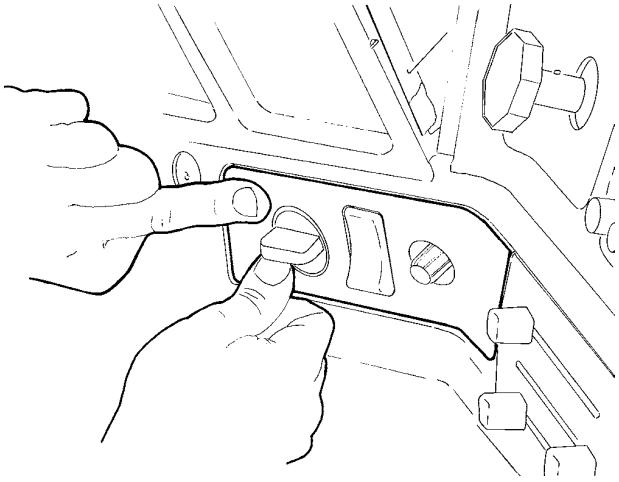
1



W3000680

Install the new switch into the panel. Push the switch into the panel until it locks. Push back on the switch to make certain it is locked in the panel. Connect the electrical connector.

2



W3000647

Install the panel by inserting tips on right side and pushing the panel into position. The clips will snap in place on the left side.

3646-03-02-12 Dash Dimmer Control Switch, Replacement

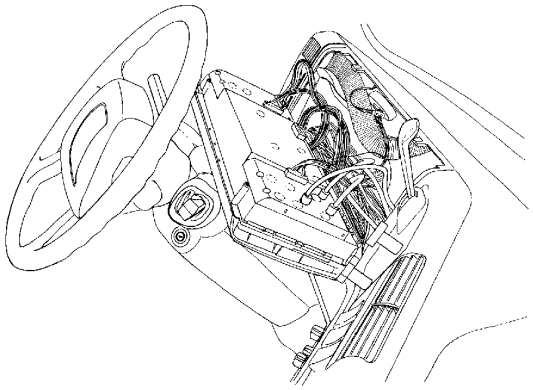
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral, and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Removal

1
Turn the ignition key ***OFF***.

2



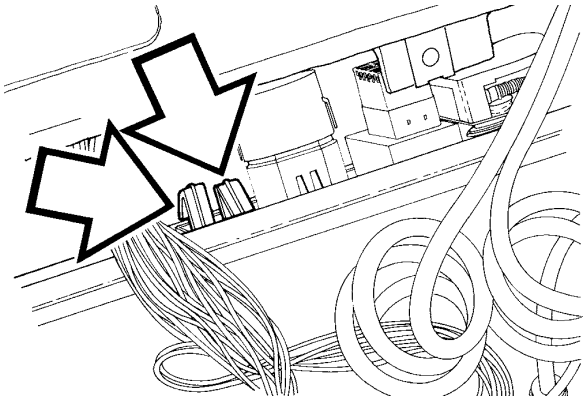
W3000641

CAUTION

Do not leave the cluster face-down for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Remove the two screws at the top of the instrument cluster and lay the cluster face-down on the steering column (if steering column is adjustable, adjust as far back as possible before leaning cluster out).

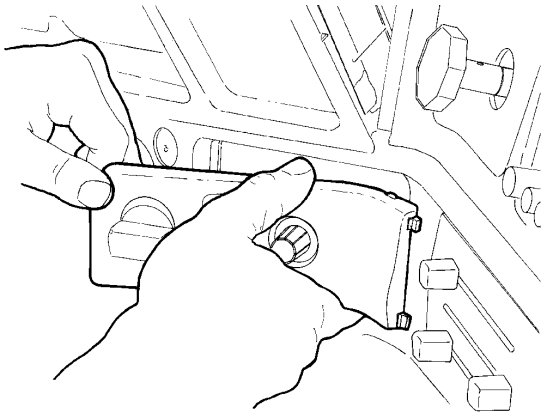
3



W3000650

To release the dimmer switch panel, reach behind the panel and depress the top and bottom clips on the left side.

4



W3000996

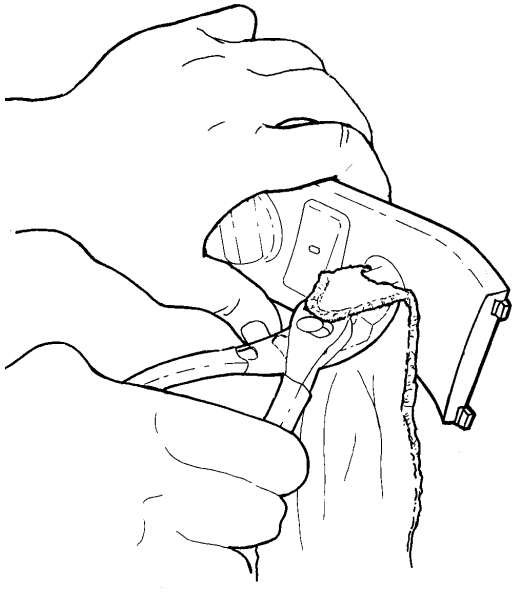
Pull the panel through the front of the dash, pulling toward the driver's side to clear tip inserts.

5

Once the panel is removed, install instrument cluster back in its original position and tighten the 2 screws at the top of the cluster. Tighten to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).

2 ± 0.3 Nm (17.5 ± 2.5 in-lb)

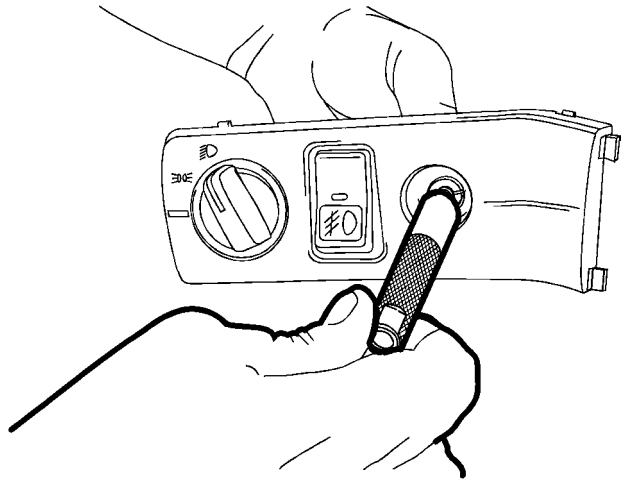
6



W3000812

Use a rag and a pair of pliers to remove the rheostat knob. Then disconnect the terminal connectors on the switch.

7



W3000798

Use the rheostat removal tool (J–42395) to remove the shaft nut from the rheostat.

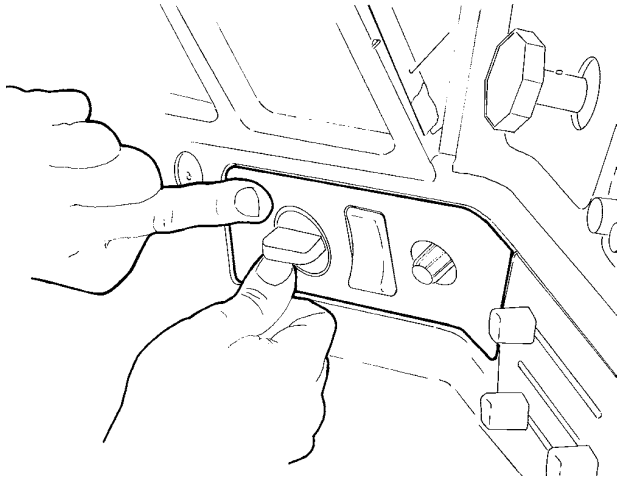
J–42395

Installation

1

Install the new rheostat into panel. Install the nut on the rheostat shaft. Connect the terminal connectors and install the knob.

2



W3000647

Install panel by inserting tips on right side and pushing the panel into position. The clips will snap in place on the left side.

3646-03-02-24 Marker Interrupt Switch, Replacement

For a complete description of this procedure, see “Right Dash/Auxiliary/Sleeper Control Panel Switch, Replacement” page 81.

3646-03-02-43 Beacon Lamp Switch, Replacement

For a complete description of this procedure, see “Right Dash/Auxiliary/Sleeper Control Panel Switch, Replacement” page 81.

3646-03-02-11 Hazard Warning Switch, Replacement

For a complete description of this procedure, see “Left Dash Switch, Replacement” page 82.

3646-03-02-33 Back of Cab Lamp Switch, Replacement

For a complete description of this procedure, see “Left Dash Switch, Replacement” page 82.

3646-03-02-37 Headlamp Interrupt Switch, Replacement

For a complete description of this procedure, see “Left Dash Switch, Replacement” page 82.

3646-03-02-36 Bunk Overhead Lamp Switch, Replacement

For a complete description of this procedure, see “Left Dash Switch, Replacement” page 82.

3646-03-02-29 Sleeper Control Panel Switch, Replacement

For a complete description of this procedure, see “Right Dash/Auxiliary/Sleeper Control Panel Switch, Replacement” page 81.

Right Dash/Auxiliary/Sleeper Control Panel Switch, Replacement

The same procedure is used to replace right dash, optional (auxiliary) and sleeper control panel switches. The right dash switches may include Marker Interrupt, Engine Brake, Traction Control, or Heated Mirror Switches. Optional or auxiliary switches are used for additional customer requested components, such as lift axles or beacon lights, and are located in the panel above the radio.

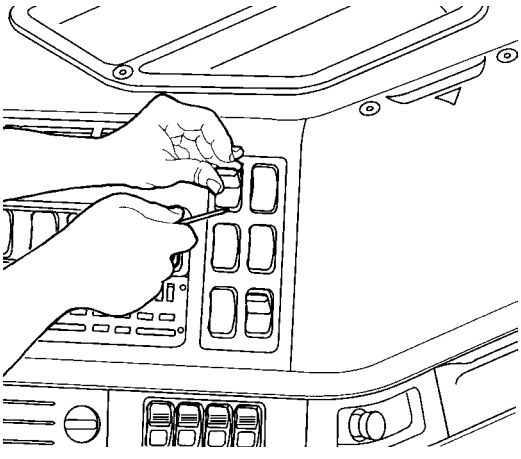
⚠ DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral, and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Removal

1
Turn the ignition key ***OFF***.

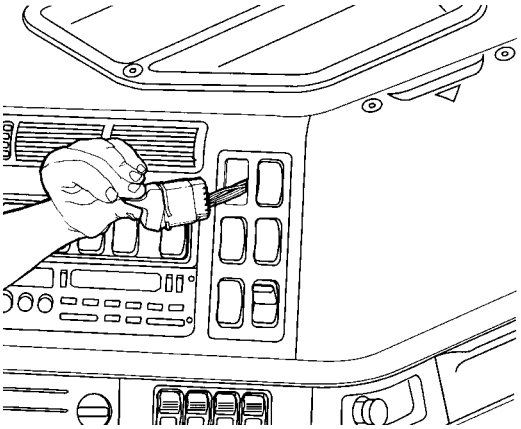
2



W3000644

Insert a No. 1 flat tip screwdriver into the bottom of the switch to release the locking tab.

3



W3000645

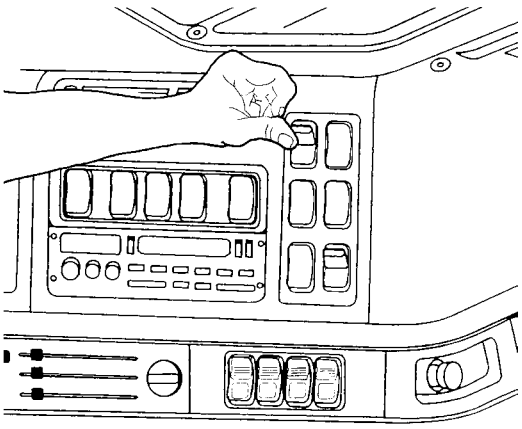
The switch will rock out at the bottom. Pull the switch down from the top and out.

4
Disconnect the electrical connector of the switch being removed.

Installation

1
Connect electrical connection on switch.

2



W3000692

Install the new switch, pushing the switch into the panel until it locks. Push back on the switch to make certain it is locked in the panel.

Left Dash Switch, Replacement

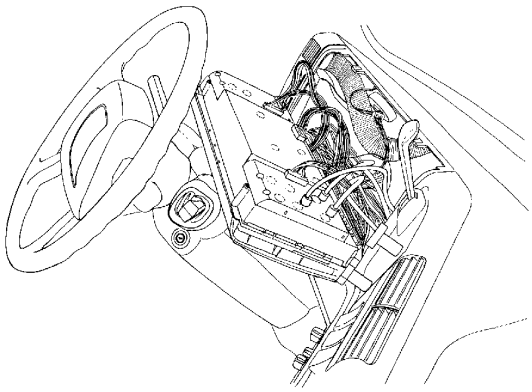
DANGER

Before working on a vehicle, set the parking brakes, place the transmission in neutral, and block the wheels. Failure to do so can result in unexpected vehicle movement and can cause serious personal injury or death.

Removal

1
Turn the ignition key ***OFF***.

2



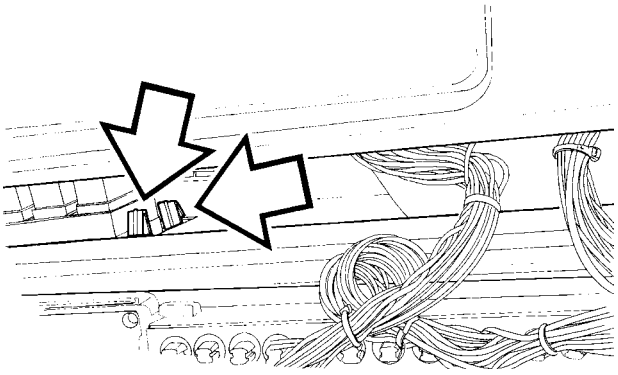
W3000641

CAUTION

Do not leave the cluster face-down for more than 15 minutes, or damage to the gauges may occur. Gauge oil can run out the front of the gauge faces and make the gauges inaccurate.

Remove the two screws at the top of the instrument cluster and lay the cluster face-down on the steering column (adjust steering column back before leaning cluster out, where possible).

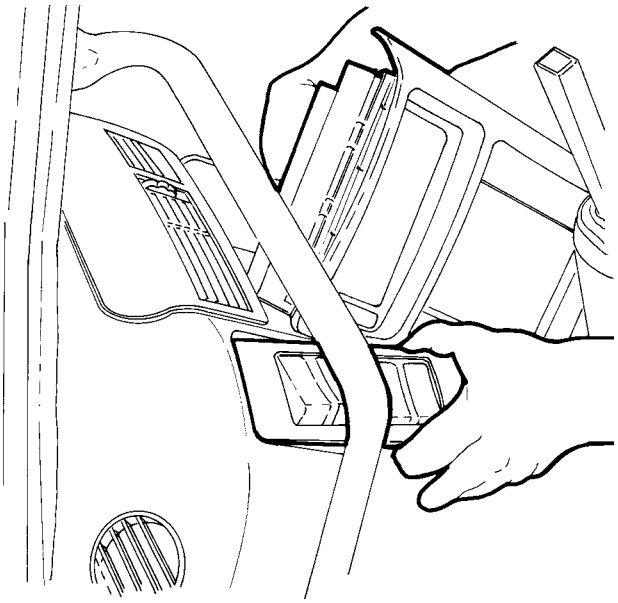
3



W3000689

To release the switch panel, reach behind the panel and depress the top and bottom clips on the right and left side of the panel.

4



W3000660

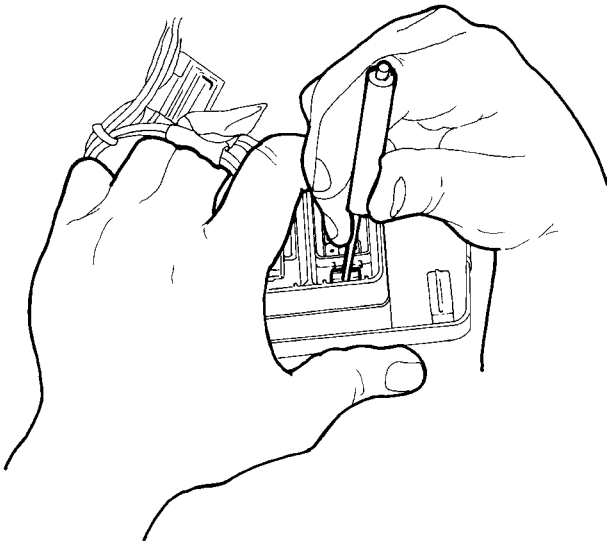
Pull the panel through the front of the dash.

5

Once the panel is removed, install the instrument cluster in the dash and tighten the 2 screws at the top of the cluster. Tighten to 2 ± 0.3 Nm (17.5 ± 2.5 in-lb).

2 ± 0.3 Nm (17.5 ± 2.5 in-lb)

6



W3000659

Disconnect the electrical connector from the switch to be removed. Insert a small flat tip screwdriver (No. 1) into the bottom of the switch to release the locking tab, then remove the switch from the panel (these switches are removed through the front of the panel).

Installation

1

Install the new switch, pushing the switch into the panel until it locks. Push back on the switch to make certain it is locked in the panel. Connect electrical connector and install panel back in dash.

Feedback

One of our objectives is that workshop personnel should have access to correct and appropriate service manuals where it concerns fault tracing, repairs and maintenance of Volvo trucks.
In order to maintain the high standards of our literature, your opinions and experience when using this manual would be greatly appreciated.
If you have any comments or suggestions, make a copy of this page, write down your comments and send them to us, either via telefax or mailing directly to the address listed below.

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From

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Comments/proposals

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Concerns Service Manual: .....

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